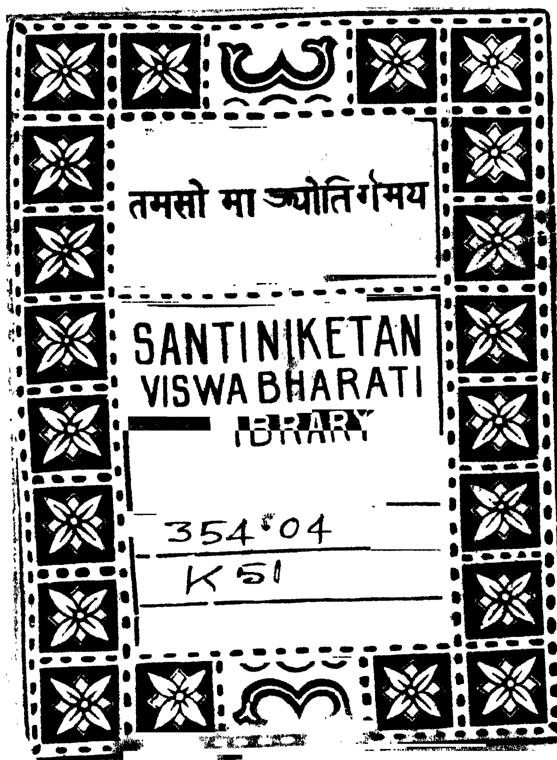


तमसो मा ज्योतिर्गमय

SCIENCE AND SOCIETY IN INDIA

FOUNDATIONS OF PLANNING

BY

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FOREWORD BY

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To
Krishnaji
(Jiddu Krishnamurti)
C. Jinarajadasa
and
Ernest Wood
Teachers and Friends
A small Token
of
Ever-abiding Affection and Gratitude

FOREWORD

I am honoured by the request of Dr Kewal Motwani to contribute a Foreword to this original and interesting series of lectures in Sociology which it has been an excellent and timely thought of the Indian Science Congress Association to ask Dr Motwani to deliver to the various Universities of India. Dr Motwani has lectured to several Universities in the U. S.A. on what he calls 'The American Science' but which its founders—Comte, Herbert Spencer and Lester Ward—envisaged as the crown of knowledge and experience indispensable for the well-being and betterment of mankind. In India he has executed his present mission with great ability, alacrity and enthusiasm. And I can personally testify to the favourable response he has elicited from the academic world. Dr Motwani has given a succint survey of the development of science from its very beginning in the Orient, its spread and distribution in the West through the march of the Saracenic civilization, and its influence upon the development of modern democracy, industrialism and nationalism and especially on the social disruption and catastrophe which Western humanity is now facing.

That science which at once civilized and barbarized the West reached India under false auspices. Strange to tell, education was actually more diffused among the

people of India in the pre-British days than now. Owing to her political and economic bondage an over-literary type of education was encouraged and science was neglected. Meanwhile *Pax Brittanica* and sanitation led to a phenomenal population growth and profoundly altered the man-land ratio, leading to a deterioration of the standard of living of the masses. A few famines that carried away in the 19th century some 33 million persons and the increasing colossal burden of agricultural indebtedness showed the bankruptcy of the economic structure. The people as a whole after a century of British rule have not become science-conscious nor progress-minded. The multiplication of schools, that impart a bookish education suitable for entry to governmental and clerical jobs and professions and consonant with the bias of the rulers, makes the peasantry turn their backs on the plough, the land and the village. On the other hand industrialization and urban unemployment have been constantly on the increase. The new landlordism and industrialism have also created a disparity of wealth between the Haves and Have-nots unknown before. The gulf between the illiterate masses, and the intelligentsia who have taken full advantage of the restricted facilities of education to exploit them, and the increasing maldistribution of wealth portend a social revolution that here and there has already begun as agrarian disturbance, communal riot, or general strike.

Science is yet confined to the colleges and

Universities, and there is a yawning chasm between the laboratory and the field and the workshop. There is no doubt some progress in the directions of improvement of crop varieties and manurial practice. But science has not been able to check the burning of cowdung, or the export of oil-seeds. On the whole, the fragmentation of holdings owing to a law of inheritance that has become an obvious economic misfit more and more stands in the way of the application of scientific methods to Indian agriculture. Further, the maintenance of a huge burden of about 125 millions of uneconomical, superfluous cattle, due to ancient superstition, is a most serious drag on agriculture and checks the normal adjustment of meagre food resources to human requirements. No nation can be progress-minded in one direction while it remains superstitious in another. The incubus of superstitions, indeed, makes science in the villages a very thin, superficial veneer. Science on the whole is scoffed at in rural India because it is not yet adapted to the social habits and traditions of an ancient people. And yet without assimilating these latter it cannot reconstruct social living. India is now importing the new democracy, the new technology and the new industry, but these still remain unadapted to our ancient civilization. That is why along with the vast new wealth and luxury of our industrial cities we have coolie lines whose squalor and degradation beat the world's records. Our democracy superimposed from the top and operating apart from

ancient and essential village and functional self-government has developed party machines, sale and purchase of votes and mob rule like their counterparts in the West. All these social maladjustments and *mores* have been delineated by our author with a sweep of generalization and sympathy of outlook that make the treatment vivid, refreshing, and dynamic in its social import.

The Universities which are the citadels of modern science have cultivated narrow specialism and isolation from the larger needs of the nation, and have, indeed, become centres of a false social valuation in so far as science is hardly taught and developed with reference to urgent social issues. A few decades of the teaching of science governed by what Dr Motwani characterizes as an individualistic ideology result in a finical, superficial attitude that stands aloof from the work-a-day world. Science began in India with a contempt and repudiation of India's spiritual and cultural values. It has now ended in thinking with the spinal chord rather than with the brain, in ignoring and even ridiculing the surrounding civilization which is sick and diseased all round, and requires the balm of science to restore it to health, beauty and nobility.

At this crisis, as one may appropriately call it in the sphere of higher learning in India, it is the stress on the social sciences alone that can conduce to that synoptic, integrated co-ordination of knowledge in respect of the concrete problems of social life, without

which the pursuit of the positive sciences in this country has been so much of a futility.

Sociology is the best guide to what Patrick Geddes calls the 'orchestration of knowledge' for the betterment of man and his environment. It is a science that stands for the validity of social values whose challenge by modern science or rather by its abuse has produced a crisis in contemporary Western civilization. That challenge can be satisfactorily answered only by sociology in order that science may not dehumanize us in India. Sociology acts as a true bridge between social habits, traditions and institutions on the one hand and the new scientific knowledge and attitude on the other. It directs the application of science for social welfare and reconstruction. It is the effective directive and inspiration of social planning. There cannot be any planning in India without the social sciences envisioning our further social and economic structure and at the same time guiding us how we can best harness the social traditions and institutions of the past to the needs of India of tomorrow; what our social and moral limitations are; and how these can be best overcome. It is human values and ideals that make and impel a people, and in so far as science has a human meaning it fits into a scheme of culture. This is the watchword of sociology.

Dr Motwani deserves the thanks of everybody for bringing forward this significance of sociology in India's

present era of planning and reconstruction. He has a keen and alert mind, observant of all social facts and changes that he can also bring into an integrated whole for interpretation and forecast. The Universities of India will do well in pondering over his timely warning and advice.

University of Lucknow RADHAKAMAL MUKERJEE

PREFACE

This book contains the course of three lectures that were delivered, under the auspices of the Indian Science Congress Association, at the various universities of our country[1] and at the Indian Institute of Science, Bangalore, during the last year. They are published as they were delivered. They are all based on one central thesis, and that is that India has made great contributions to various sciences in times past, experienced eras of cultural change as a result of these scientific investigations and achievements, and evolved techniques of bringing about a dynamic social equilibrium, orderly progress, synthesis. Synthesis, *dharma*,[2] is the key-note of India's life; it is her 'manifest destiny'. Geographical unity, fusion of races and cultures, fellowship of faiths, synthesis of science, philosophy and religion, have combined to produce a civilization that is unique, warm, plastic, beyond the challenge of time. Thus, the present-day impact of science on India does not present an unfamiliar problem to her, and if her youth will study reverentially the essentials of Indian culture and the new forces that are surging through the heart of humanity and beating

1. Andhra, Annamalai, Agra. Bombay, Benares, Calcutta, Dacca, Delhi, Lucknow, Madras, Mysore, Muslim, Nagpur, Osmania, Patna, Punjab, Travancore and Utkal Universities. These are all but one.

2. Dharma comes from the Sanskrit root, *dhṛ*, to hold together.

upon India, they will succeed in stemming the tide of the cultural assault from the West and in giving a new incarnation to that genius of India that has known the secret of eternal youth.

The first lecture begins with a definition of Science, traces its origins which lie in ancient India; follows the migration of science to the West through Greece, Arabia and Italy. It takes up the impact of science and its creation, machine, on the life and thought of Europe, beginning with the Industrial Revolution, indicates the interlocking of the social and ideational aspects of associated life, and postulates the process of conflict, *adharma*, antithesis, as being the predominant *motif* of the modern technological West.

But the era of conflict is yielding place to a new age, the dim outlines of which can be discerned on the horizon, even amidst the present period of universal carnage and destruction. The second lecture therefore, presents, albeit too briefly, the signs of the social changes pointing in the new direction. It puts together the latest contributions of science in the field of production of mechanical energy and its application to man's daily wants, such as food, clothing, medicine, housing, agriculture, industry, mining, town-planning, transport, etc. This is followed by a brief outline of the new trends in the economic and the political ideologies; and all this is helpful in projecting our vision into the future to detect some signs of sanity

returning to mankind, and thus refresh our faith in its humanity and divinity.[1]

With this background of the two worlds, the one in the throes of death and the other in the course of being born, we turn to India. India is a part of the world and all her schemes of national planning must be conceived in terms of the world drama that is being staged today. Not only the political perspective but the scientific and the ideological also are a necessary corrective to our narrow vision. India, during her æonian past, has developed a culture of her own, with certain well-defined values, social and spiritual. Also during her contact with the West, India has adopted the Western culture of machine and science and she contains within herself those elements of conflict that have led to the present catastrophe.

The third lecture, therefore, essays to indicate the essential nature of the Indian culture, the values that are implicit in India's history, since this has a close bearing on the special significance of national planning in India. Then follow brief analyses of the causes of India's backwardness in utilizing science and machine and of the zones of stress and strain that have come into being as a result of their impact. In order that India may be able to meet the challenge of the present

1. According to the late Professor Lester F. Ward, the Dean of American Sociologists, study of social sciences in general and of Sociology in particular should enable us to gain a vision of the future and plan social change. If they cannot help us in this task, they are the most useless of intellectual disciplines in which a man can engage.

and plan her future without losing her soul, it is essential to form a mental picture of the India that we want. An ideal gives a meaning and a purpose to all activity, and with this ideal in view, we proceed to a disscussion of the techniques with the aid of which the goal may be achieved. These techniques, presented in bald outline, seek to emphasize the enhanced use of machine and science in the overall reconstruction of India's national life. Since it is not possible to present a scheme of national planning, complete in all its parts, in the course of one lecture, attention has been concentrated on one segment of the social reality, education —since education is a link between the past, the present and the future — and an attempt has been made to indicate the technique of synthesizing the use of science and machine with India's educational idealism and her present-day needs.[1]

Two Appendices have also been added. The first deals with the appallingly backward condition of social sciences in the British Universities. The purpose is not to criticize the system but to point out a lesson for my countrymen. If sociological studies in India are not to suffer from the same arrested growth that has been their fate in the capitalistic, imperialistic Britain, then India must strike out a new path for herself. It will be tragic if the cussedness and ignorance of

1. It need hardly be added that the views expressed are entirely mine and in no way binding on the Indian Science Congress. At some future date, it may be possible to deal with the whole question of planning from the point of view presented here.

those who are in a position to give a new orientation to our education should perpetuate the present imitation of the alien outworn patterns of education forced on us by the rulers. The second Appendix gives a brief outline of the situation prevailing in India. I have not attempted to deal with the status of each social science in Indian education; that is the task for the respective Learned Societies to undertake. My chief concern has been to indicate their unco-ordinated condition and the dangers arising therefrom. The Appendix, therefore, indicates briefly the preliminary steps taken to awaken interest in (i) introduction of Sociology as a compulsory subject in high schools and colleges and for making it a subject of post-graduate research in the universities; (ii) in the starting of a Research Institute and Training Centre in social services and public administration, recommended by a Committee of the Central Advisory Board of Education, Government of India; and (iii) in the establishment of an Indian Academy of Social Sciences to co-ordinate the work of the various Learned Societies, now living their atomic, sterile existence of dull, grey monotony, functioning in isolation and mutual antagonisms.

It is gratifying to notice signs of the stirrings of new life, and attempts made in this direction have not been wasted in wilderness. With regard to Sociology, the Inter-University Board of India, composed of all the Vice-Chancellors, has passed a resolution at two consecutive meetings, urging the universities to introduce

Sociology as an undergraduate subject. The Central Advisory* Board of Education, Government of India, has lent its pompous prestige by endorsing the resolution of the Inter-University Board.[1]

About the establishment of a Central Research Institute and Training Centre, the Government has no choice in the matter, if its schemes of national planning are to succeed. It will need services of scores of young men and women, trained in the techniques of social sciences, or else all its schemes will go awry and defeat their very purpose. Finally, an Indian Academy of Social Sciences can become a veritable Brain Trust of the nation, a National Planning Commission in permanent session. It can become a focal point of the latest developments in social thought in various parts of the world, a clearing-house of ideas to jostle our effete educational machinery into intelligent action and to help the Governments, Central and Provincial, with

1. Sociology, in its modern version, is an American science. There is not a phase of social life that is not studied in the U. S. A. with a masterful thoroughness. Most of the American universities and other institutions of higher learning, cover the field of social life and offer instruction in: Human Ecology; Cultural and Social Anthropology; Ethnology; Social Biology; Man in Society; Social Attitudes; Social Differentiation; Social Mobility; Social Psychology; Social Processes; Means of Social Control; Propaganda; Public Opinion; Collective Behavior; Educational Sociology; Sociology of Marriage; of Family; of Divorce; Population Problems; Race Problems; Sociology of Economic Relations; Political Sociology; Criminology; Penology; Sociology of Religion; Sociology of Arts; Rural Sociology; Urban Sociology; Social Change; Social Organization; Social Case Work; Social Administration; Social Progress; Social Thought in Ancient Civilization in Asia, Europe and America, See Author's *Sociology: A Brief Outline.*

its expert advice; and, above all, it can serve as a sentinel of India's cultural values to be carefully guarded in and through all the schemes of reconstruction. The plea for such an Academy has received endorsement of all the Vice-Chancellors but one, of the many scientists and leaders of our country, of some of the Learned Societies of India, and of numerous eminent educationists of the U. S. A. and the British Isles. It is my firm conviction that if Indian education is to be salvaged from the hypnotic thrall of the backward pattern of education inherited from India's alien rulers,[1] if it is to serve the younger generation and help it to live in the twentieth century and place in their hands effective instruments and techniques to withstand the cultural assault from the West and safe-guard India's rich, spiritual heritage; if India would have an active watchful agency to keep her on the right track and yet make available to her the rich and varied experience of the world around; if the national schemes of planning are to succeed with the help of an administrative staff trained in the art of 'simultaneous thinking', and not merely writing and signing office memoranda, then all the steps of reorientation of education, indicated

1. I have dealt with this subject in various articles published, during the last five years, in the *University of Madras Journal*, *the Law College Magazine*, *the Theosophist*, Madras; *the Bombay Chronicle*, *the Indian Social Reformer*, *the Kaiser-i-Hind*, *the Voice of India*, Bombay; *the Scholar*, Palghat; *the Hindusthan Review*, Patna; *the Journal of the Federation of Educational Associations*, Cawnpore; *the Kalyana Kalpataru*, Gorakhpur; *the Indian Journal of Social Work*, *the Sindhian World*, Karachi; *Young Ceylon*, Ceylon.

herein, are matters of urgent necessity and not mere intellectual dilettantism. An education, dedicated to the training of the 'whole man for the purpose of general human welfare'—if I may use the expression of an illustrious statesman, Mr Henry A. Wallace, the ex-Vice-President of the United States of America—will alone save India from the cultural conquest that has her in its ruthless grip today. A new socialized education, pressing into service the contributions of machinery and science, but true to the genius of the nation is the real *national* education for India. Without it India is doomed to continue to wallow in her present status of being an intellectual and cultural camp-follower of the degenerate, destructive, soulless West.

Some of the material used in my lecture, 'Science and Indian National Reconstruction', delivered before the Indian Science Congress, held in January 1942 at Baroda, and published by the Congress, has been incorporated here.

My thanks are due to my esteemed friend, Professor D. N. Wadia,[1] for his continued interest and encouragement in my work; to the Indian Science Congress Association that sent me as it first official emissary to the Indian Universities, during the thirty years of its existence, to deliver this series of three lectures; to the Indian Universities and the Indian

1. Formerly of the Geological Survey of the Government of India, now Director of Mineralogy, Government of Ceylon, and President of the Indian Science Congress for 1941-2 and 1942-3.

Institute of Science, Bangalore, that received me in their midst; to the students, the teachers and the public who gave me a patient hearing and showed interest in my point of view; and, finally, to Seth Kewalram Chellaram, a leading merchant of Sind, whose appreciation of the problem facing our country found expression in a spontaneous gesture of generosity and whose financial assistance to the Indian Science Congress made possible this lecture-tour of the Universities. I am also grateful to Professor Radhakamal Mukerjee for giving a Foreword to my book. His remarks concerning my work in American and Indian educational institutions and in awakening interest in Sociology and establishment of the Academy are generous to the point of embarassment. I am also thankful to Professor James H. Cousins, for going through the manuscript.

And to my wife, I can never be adequately grateful. Her continuous and willing toil for many years has made all my work possible. Notwithstanding heavy duties connected with her educational work in Ceylon, she went through the whole manuscript, gave many helpful suggestions and prepared the Table of Contents. Were it not for her the book would have never been published.

K. M.

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1. THE IMPACT OF SCIENCE ON HUMAN SOCIETY

The rapidity with which science places its processes and products at the disposal of man for his daily use gives him no opportunity to stand aside and appraise objectively the contributions of science to social changes. Yet science is the most outstanding trait of the culture-complex of today, and it affects man and society at every point all over the world. There is no part of the globe, however remote and isolated it may be, that has not been drawn into the vortex of the present world-situation precipitated into being by science and its creations. It is therefore fit and proper that the Indian Science Congress, the premier scientific organization of India, should devote its attention to the social effects of science, so that our country may make an increasing use of science, and in conformity with our national ethos. I value highly the honour done me by the Indian Science Congress Association by charging me with this commission to be carried to the universities of our country, the first experiment of its kind in the course of thirty years of its existence. But I should like to add that the views expressed during the course of these lectures are entirely mine and in no way implicate the Indian Science Congress.

DEFINITION

Science has been defined by its votaries in various ways. A method which 'applies to all reasoning about

facts which proceed, from their accurate classification, to the appreciation of their relationship and consequence'[1] as knowledge and truth, as law and perfection, as an attitude of mind, as intellectual orientation, as hypothesis and common sense—these are some of the conceptions of science held by various scientists. But, as I see it, all these can be reduced to two basic meanings or aspects of science, which are: firstly, that science is a method of search for the Real in the realm of the phenomenal, as philosophy, religion and mysticism are methods of search for the Real in the realm of the noumenal. The former deals with *prakriti*, the latter with the *purusha*. Science proceeds by well-planned methods of definition, organization, analysis and classification of facts, and deduction of laws, 'timeless truths' as Spengler calls them. It is the application of man's divine faculty of reducing a vast array of facts and 'an illimitable assembly of other worlds' (Sir Oliver Lodge), to a small compass, into an easily comprehensible and interacting system of knowledge. This is the pure, theoretical or philosophical aspect of science.

The second aspect of science is its application to the problems of life. Here, science descends from its empyrean heights of abstract speculation and enters the haunts of the humble. It confronts the question of human welfare, man's physical well-being, comfort, health, his emotional stability, refinement, security, his

1. Karl Pearson: *The Grammar of Science*, p. 24

intellectual opulence and spiritual adventure. Here, science becomes the handmaid of the practical art of living and human association, here and now, not in some far-off future and in the promised land of heaven. This is the pragmatic or utilitarian aspect of science. The first approach, Ladies and Gentlemen, concerns you, the fortunate children of fate, isolated, for the time being, from the strife of life, secure within the sheltered walls of this institution. The latter, the utilitarian one, is my field. At a time when the whole world is being rocked in a crescendo of convulsions, and the fate of humanity is precariously poised on a precipice, it is a matter of urgent concern for all of us to pause for a moment, take account of what we have done with science, and what we may be able to do with it to build a happier future.

Science, from both points of view, has an ancient and sacred ancestry. Its origins lie in India. To an audience composed of my countrymen and women I need offer no apologies for devoting a little time to the origins of our subject; indeed, this procedure will help us to throw into bold relief the effects of the impact of science on the modern world, which is the subject of this evening.

The beginnings of science lie in the early Vedic period. *Sama* and *Atharva* Vedas laid the foundations; out of these grew up the *Upa Vedas, Vedangas* and the Six Schools of Thought. Medicine, music and dancing, archery and military science, architecture, the science

of phonetics, of metrics, of grammar, the science of etymology, astrology, and astronomy and the science of ritual formed the *Upa Vedas* and *Vedangas*, while the Six Schools developed systems of logic, the atomic conception of matter, the relationship between matter and spirit, the science of expansion of powers of consciousness and of self-realization through meditation, the ritualism and philosophy of unqualified monism. All these applied sciences were based on natural or exact sciences. They were not empirical assumptions, but experimental systems of Science and History.

MATHEMATICS

India developed a highly advanced system of mathematics. The so-called Arabic numerals and the decimal system are India's gift to the world.[1] The former are found in Asoka's Edicts, 256 B. C., and that is one thousand years before their appearance in Arabic literature. The Hindu mathematicians, Aryabhatta and Brahmagupta, knew the decimal system before it appeared in Arabia. The Buddhist missionaries from China took the decimal system to their country, and

1. 'It is possible that Indian thought influenced the schools of Asia Minor, and through them those of Greece, and it is certain that, at a later date, during Arab domination in the lands of the Eastern Mediterranean, traces of the mathematics and medicine of India mingled with the learning saved from Greece and Rome, and re-entered the schools of Western Europe by way of Spain and Constantinople. This explains the fact that, when the Indian scheme of notation replaced the clumsy Roman figures, the primary sources of the numerals was forgotten and they were misnamed Arabic.' Dampier, Sir William Cecil, *A History of Science*, p. 10

Mahmed Ibn Mossali Khwaja Nizami took it to Baghdad in 850 A. D. Indian philosophers who discussed *moksha*, *nirvana*, nothingness or non-existence, did not find it difficult to discover the symbol of zero, the most modest and valuable of all symbols. Algebra, in spite of its Arabic name, is India's gift. Indian mathematicians invented the radical sign and many algebraic symbols, developed the idea of negative quantity, formulated rules for permutations and combinations, found the square root of 2, and solved indeterminate equations to the second degree, one thousand years before Europe came to know of them. Geometry revealed the symmetry of the Cosmos; the *Rta* conception of the Vedas was its direct antecedent. Sir James Jeans is stating a truth long ago uttered by the Vedic seers when he says that the creator of the Universe must be a Grand Geometrician. The Pythagorean theorem was India's discovery many centuries before Pythagoras. Hindu mathematicians found the area of a triangle, a circle, a trapezium, calculated the relation of diameter to circumference. Bhaskara anticipated the differential calculus, Aryabhatta prepared the table of sines. The *Surya Siddhanta* gives a system of trigonometry far ahead of that of the Greeks. Astronomy had early beginnings in India. Astronomical observations in the Vedas are recorded so accurately that the late Lokamanya Tilak was able to calculate the age and the home of the Vedas! Later writers systematized this knowledge and discussed sines, equations, eclipses of the sun and

moon, equinoxes and solstices, posited the sphericity of the earth and the diurnal revolution on its axis, expounded the theory of gravity, invented a compass made of an iron fish, floating in an oil vessel and pointing to the north. They divided the sky into twelve zodiacal signs, made a calendar of twelve months, each month of thirty days, each of thirty hours, with an additional month for every five years, calculated the diameter of the moon, the position of the poles, the motion of the major stars, discussed their influence on human beings and thus developed an accurate system of astrology. They estimated the age of the earth, calculated the *kalpas*, *manvantaras* and *yugas*[1] and posited the purpose of human history and progress.

The Indian scientist sought the truth of things, large and small. The galaxy was no more important than an atom. Kanada's Vaisheshika laid the foundations of the science of physics. He maintained that the world was analysable into atoms that were permanent, that heat and light were manifestations of one energy. Udyana maintained that the heat of the sun was the source of all heat on earth, and Vachaspati anticipated Newton in interpreting light as radiation from an article striking the organ of vision. Musical notes and intervals were carefully and mathematically calculated, and the Pythagorean Law was known many centuries before Pythagoras propounded it.

1. Eras of geological and cultural change

CHEMISTRY

Investigations into the physical nature of matter were accompanied by research into its chemistry, and the results were applied to medicine and industry. India achieved an early reputation for her supremacy in industrial arts involving knowledge of chemistry. The chemical excellence of cast iron was known in Chandragupta Maurya's time (600 B. C.); knowledge of burning metals, such as steel, gold, iron, silver, etc. was considered a necessary qualification for a Minister of Mines by Kautilya! Nagarjuna (200 B. C.) wrote a whole volume on mercury. Chemical industries, such as dyeing, tanning, glass, cement, soap-making, were developed long before the Christian era. Some of the Egyptian mummies were found wrapped in muslins that were made and dyed in India. She possessed knowledge of calcination, distillation, sublimation, steaming, fixation, production of light from heat, preparation of anaesthetic and soporific substances, of metallic salts, compounds and alloys. Knowledge of tempering steel had attained perfection by the Mauryan period. The Damascus blade was India's invention, taken by Persians and later by Arabs to the West.

This knowledge was put to use to alleviate human misery and pain. The *Atharva Veda* gives symptoms of many diseases, while the *Rig Veda* contains the names of over a thousand herbs for purposes of cure. The *Ayurveda*, Science of Medicine, is a later development. Hindu medicine traces the causes of

human illness to disorders in the four humours: air, water, phlegm and blood, and the treatment is medical and psychological. Knowledge of chemistry was essential, as also of Vaisheshika and Sankhya Schools, for successful practice of medicine, since they gave an insight into the interrelations of mind and matter.

The origins of this science of diagnosis and cure are attributed to Dhanvantari by his successor, Sushruta, a Professor of Medicine in the University of Benares in the fifth century B. C. Sushruta deals with various problems, such as obstetrics, surgery, baths, drugs, diet, infant-feeding, hygiene, medical education, etc. He mentions surgical operations for hernia, lithotomy, cataract and caesarian section, and lists numerous surgical instruments, such as forceps, catheters, sounds, lancets, rectal and vaginal speculum. He permitted dissection of dead bodies for training in surgery, performed grafting operations, introduced rhinoplasty which has come down to modern times, systematized the techniques of operation, sterilized wounds by fumigation. Amputation of limbs, abdominal operations, removal of fistulas and hemorrhoids, and setting of fractures were also widely practised by him in the pre-Christian era. The use of medical liquors for producing insensibility to pain was known to Sushruta. He enumerates 1,120 diseases, recommends diagnosis by inspection, palpitation and auscultation. Vaccination was known at this time, if a text attributed to Dhanwantari is to be relied upon. Hospitals were known in Chandragupta's time; Ashoka

established them extensively over the whole of his empire. Charaka's injunction to new entrants to the profession of medicine anticipates Hippocrates by many centuries. His words were: 'Not for self, not for the fulfilment of any earthly desire for gain, but solely for the good of suffering humanity should you treat your patients, and so excel all.'

ANATOMY AND PHYSIOLOGY

Anatomy and physiology were highly developed sciences. Bhava Mishra wrote voluminously on anatomy, physiology and medicine in 1550, anticipated Harvey by a century about blood circulation, prescribed mercury as a cure for syphilis, Europe's gift to India of those days. Hindu physicians described as early as the sixth century B.C. ligaments, sutures, lymphatics, nerve plexus, fascia, adipose and vascular tissue, mucus and synovial membrane and other muscles that a modern can discover. They know the various processes of digestion and the existence of gastric juices. Foetal development was described fully. The sex of the embryo was considered subject to change with the aid of food and medicine. Birth control during the dry period was known. Dangers of inheritence of tuberculosis, epilepsy, leprosy, and dyspepsia are also recorded. A strong manhood was considered as an essential qualification for marriage, so as to ensure a strong physical and spiritual heredity for the nation. Action of yoga and its effects on the various parts of the body and the

genes was common knowledge. It was maintained that the cosmic energy, taken in through yogic practices, affected the atomic structure of the genes which determine heredity, and this energy was responsible for the miracle of mutation. The modern biologist is trying to understand what all this means.

INDIAN ATTITUDE

This brief survey of India's achievements in sciences, natural and applied, forms one of the most thrilling chapters in the history of human knowledge; but we must leave the subject here, and move on with the story of its migration to the western world.[1] But there is one fact which we should bear closely in mind, and it is this: that all these sciences were closely linked with each other; mathematics, physics, chemistry, astronomy, astrology, biology, physiology, anatomy,

1. I consider this brief survey essential to the thesis presented herein. The writings of western historians of science suffer from an air of racial arrogance and they do not hesitate to suggest that everything began with Greece, excepting the laws of nature. Even so thorough a scholar as Sir William Dampier gives one paragraph to India's contributions to science. The latest evidence of this attitude is reflected in the Symposium of 'Science as Humanity', *The Advancement of Science*, pp. 307-22, Vol. 2, No. 8, August 1943, official organ of the Division of Social and International Relations of Science, of the British Association for the Advancement of Science. As scientific students of the subject, dedicated to discovery of truth and not yoked to preservation of attitudes of academic chauvinism, we should learn to cross the cultural and continental boundaries and seek truth at its source. The Indian scientist must not only become aware of his ancient and proud heritage but also realize that India has known the technique of planning cultural change. Science is not new to India and India's technique of adjustment is of world-wide significance.

psychology, ethics and philosophy, formed one organic whole. They merged into one another, moved about freely into one another's domain, enriched each other's content. Life was seen as an organic whole. Knowledge for the sake of knowledge was considered a futility. All knowledge must relieve pain; man was a self, an *atman*, whose nature was *sat-chit-ananda*. Happiness was his birthright, and all knowledge was to stand before this bar of pragmatic judgement.

All these achievements of India in the realm of science, as well as in art and philosophy, migrated along with her merchandise to various parts of the world. According to well-known sociological laws, every objective trait of culture that migrates to an alien region carries with it its subjective implications and vice versa. Thus, Indian manufactured commodities and Indian art, philosophy and science went together, and one of the western nations to profit therefrom was Greece.

THE GREEKS

These were a primitive group of people. Their small island city-states fostered mutual animosities as well as maritime activities, and recent researches have proved conclusively that a nation that had just emerged from 'untutored barbarism' made pretentious claims to originality of thought and scientific research. According to an English scientist, the Greeks were not interested in solving the mystery of the universe. They were 'pirates turned merchants', and

they wanted to acquire 'by fair means and foul all the techniques of the ancient world' to serve their practical interests. They have contributed little to the philosophic thought and scientific achievements of mankind, and it was not long before the study of science was discouraged as being a study of 'what comes for a moment into existence and then perishes'.

The Alexandrian Empire and Hellenic States that followed evinced more interest in the practical side of science. The few problems that faced them pertained to building and war. Consequently, architecture, siege and naval warfare and military engineering gave impetus to mechanics, and Archimedes attained the eminence formerly achieved by philosophers. In Alexandria, science was systematized and the well-known Museum became a combination of university, library and research institute.

ISLAM

In subsequent centuries, Islam took up the role of Greece and became a bridge between India and the West. The Arabs ransacked not only the Indian kingdoms, but also Indian philosophic thought and scientific achievements. As already stated, they took Algebra, Chemistry, Alchemy and other industrial arts from India and gave them to Europe. But they did not make much headway in the Europe of the Middle Ages that was 'still barbarous'. The Church offered strong resistance, and a comparatively stable social

order discouraged scientific research. But rapid rise in trade and accumulation of wealth displaced feudalism and gave birth to the Rennaisance and to a renewed interest in science and philosophy.

ITALY

Italy was in the vanguard of this movement. She gave most of the scientists of the 15th, 16th and 17th centuries, with the exception of Kepler, who was a German. Not a few of them were persecuted; Bruno was burnt at the stake, Galileo made to recant his theories. But the Universities of Padua and Bologna retained their independence and gave shelter to science, and the first scientific academy, Accademia dei Lucei, was started in Rome in 1601.

ENGLAND

In England, on Francis Bacon fell the mantle of the high priest of science. He has been rightly called the 'Father of Experimental Philosophy'. Unlike Plato's *Republic*, Bacon's *New Atalantis* presented a picture of the new world where the imposing achievements of science would be organized on the principles of efficiency and in the service of man. This was probably the first time in the western world that a great philosopher, jurist and scientist, all rolled in one, gave expression to thoughts that remind us of the Vedic scientists and seers. As Macaulay rightly remarks in his Essay on Bacon: 'What was then the end which Bacon proposed to himself? It was, to use his own

expression, "fruit". It was the multiplying of human enjoyment and the mitigating of human sufferings. It was the relief of man's estate...It was continually to give to human beings new methods, new tools, new paths. This was the object of all his speculations in every department of science, in natural philosophy, in legislation, in politics, and in morals. Two words form the key of the Baconian doctrine, Utility and Progress.'

From Bacon's efforts and dreams arose, in 1645, the 'invisible college', later rechristened as the Royal Society, in 1662, with a Royal Charter issued by Charles II after his Restoration. Newton, who followed Bacon, started the era of quantitative calculation in the domain of mechanics and physics, and, after nearly a century of comparative blank in its history, science became wedded to industry, and initiated what is commonly known as the Industrial Revolution. It is from this time onwards that the social implications of science assume far-reaching significance, world-wide in their scope, for a student of contemporary civilization.

INDUSTRIAL REVOLUTION

By Industrial Revolution is usually meant the change from hand to machine-method in the production of goods. But from the sociological point of view it stands not only for this change in the method of manufacture but also for the economic, the political

and the social changes that have taken place as a result of its birth. The Industrial Revolution is still going on. It has not run its full course; many parts of the world are just beginning to feel its impact. The immediate cause of the Industrial Revolution was the invention of machinery.

TEXTILES

The first invention was of the spinning jenny by James Hargreaves in 1764, a device by means of which several spindles were operated by one hand. Hargreaves' jenny spun finer thread, but Arkwright's 'water-frame' was faster. The textile industry was the first to be revolutionized by the introduction of machinery. Whitney's invention of the cotton gin, a machine which could pick cotton from the seed fifty times faster than man, came in 1793. The improvement in manufacturing cloth brought down the price, increased consumption and created a new demand for raw materials.

USE OF STEAM

The improvements in machinery went on side by side with improvements in manufacture. In 1760, charcoal furnace was substituted by a blast furnace using coal; in 1790, a steam engine was used to operate the bellows. In 1785, steam began to be used for power in cotton mills and it was taken over by other branches of manufacture.

TRANSPORTATION

The system of transportation was considerably influenced by it. In 1807, Robert Fulton, an American, made a steam boat commercially practicable. His *Clermont* completed the trip from New York to Albany in thirty-two hours. In 1819, the *Savannah* crossed the Atlantic, using steam and sails; in 1839 the voyage from Bristol to New York took fifteen days and ten hours. The railway locomotive is a child of those days. In 1808, Richard Trevithick built a locomotive that ran twelve miles an hour on a railway in London. George Stephenson made improvements; by 1850, all the large cities of England were connected by railways. Some of the European countries and America were soon covered with railway tracks.

AGRICULTURE

In addition to textiles and transportation, agriculture came in for radical transformation. As factories multiplied, men and their families moved from villages to cities. Individual small-scale farming under the domestic system became impossible. Demand for farm-products went up quickly. The factory worker could not combine agriculture with manufacture. Changes in agriculture soon followed. The enclosure movement squeezed out the small farmer and made large-scale farming possible. The food supply of the newly industrialized countries improved to some extent. All the above phases of the Industrial Revolution are

common to all the European countries and the United States of America.

This, then, is the genesis of modern western civilization. Science and machine have been its chief characteristics. With their aid, man went into the bowels of the earth in search of coal, iron and other metals. He quickened the pace of earth's productivity to satisfy his ever-increasing wants. He covered the continents with steel tracks, telegraph and telephone poles, and laid out vast cable systems under the sea. Nature was subordinated to considerations of commerce and profit. Man and nature came to be ranged in opposite camps; the seeds of the culture of conflicts were laid here.

INCREASED PRODUCTION

One of the immediate results of the application of science to industry was enhanced production. The productive capacity of labour rose very rapidly, and consequently there was a tremendous increase in the quantity of commodities produced. The foreign trade of European countries went up by leaps and bounds. The combined value of English imports and exports in 1701 was twelve million pounds sterling; in 1920, nearly four thousand million. Population leapt up. Cheap food made marriage desirable, since each child was a potential wage-earner. Philanthrophy and advance in medicine cut down the death-rate in European countries. In one hundred years, the population of Europe rose from 180 million to 500 million.

THE URBAN PROBLEMS

Large cities sprang up rapidly. From 14 cities with 100,000 population in the beginning of the 19th century in Europe, the number rose to 140 at the end of the century. Specialized centres of industry, such as those of ship-building, mining, engineering, banking and others came into existence. Slum areas multiplied. Problems of water-supply, housing, sanitation, fire-protection, etc. burst upon the countries suddenly and could not be handled easily.

CAPITAL VERSUS LABOUR

The increasing tempo of industrialization drove a wedge into the very structure of society and divided it into two classes, the capitalistic and the labouring. The wealth produced by increased trade and transportation was reinvested in industries and made to produce still more capital. Large corporations and companies grew up, but their policies were governed by the capitalists. Women and children were drafted into industry. Hours of work were long, dangerous machinery was left unguarded, wages were low, factories insanitary. The labourer was no longer an artist, impressing his individuality on the work he helped to create, but a wage-earner, an economic hand. The nondescript life of the city depersonalized him, robbed him of his slender resources of self-defence, invited him to a career of self-indulgence and irresponsibility. This situation gave rise to labour

movements all over Europe; with capitalism went class war.

COMMERCIAL RIVALRIES

Thus, the steady advancement of science and machine combined to complete the protean transformation of agricultural countries into industrialized nations, sent them scurrying round the world in search of markets, buying raw materials, and selling their manufactured products at the point of the bayonet wherever they met with opposition. The gaping jaws of the machine had to be continuously fed with raw materials so that they could yield finished products. The succulent parts of the world were sucked dry of their natural resources, and the steel claws of the machine retained these countries so as to sell them their manufactured commodities. The indigenous industries of the conquered countries died out as a result of the impact of science and machine.

CARVING UP OF CONTINENTS

Possession of colonial markets necessitated defence of those markets, which, in turn, required building up of naval bases. Rivalries for railway concessions in backward countries began. Indeed the acquisition of fresh markets became an increasing necessity with the industrialized countries, since their energies became concentrated on manufacturing, while food-stuffs had to be brought from abroad for their sustenance. Profits

from trade were enormous. Mines, rents, factories and foreign trade led to accumulation of capital at home and its investment abroad, where the trader wanted protection. Any competition, any interference with trade rights by another country, was stoutly resisted. It became an 'insult to the flag'. Quickly vast territories were annexed. Asia became the battle-ground of European commerce and industry, while Africa was parcelled out somewhat quietly. Britain and France acquired about four million square miles of territory each by 1914; Germany, one million, Italy 600,000; Japan 122,000. Even the United States joined the game for fun, acquired the Philippine Islands and a few Carribean Sea countries, and possessed 716,740 miles, while little Belgium came to own 900,000 miles! The vast populations of these countries worked and produced raw materials for manufacture in their masters' countries. The whole story of annexations may be summarized in a few words: gun-boat, bottle of beer, bayonet, baccy and Bible.

Thus, the western world witnessed a great activity following upon the application of science and machine to daily life. Specialized interests and groups such as those of shippers, financiers, armament manufacturers, military and naval groups, colonial officials, merchants, missionaries, politicians, diplomats and explorers came into being. National psychologies went through complete transformation. Public belief in national, economic, racial and political supremacy, for

national prestige and honour, came into being. International jealousies increased as a result of competition for a 'place in the sun'. Nations invented slogans, flags and legends of supremacy and self-righteousness. White men's burden, *mission civilization*, kultur, became their watchwords. Industrialism offered plentiful opportunity to these lusty offsprings of it to thrive.

THE NATION

The separatist tendency so characteristic of industrialism made itself felt in the national and the international situation in Europe and America. At this time, the 'nation' was born. Most of the leading powers of Europe achieved the form of government which they retained until the world war of 1914. The Dual Monarchy of Austria-Hungary, the German Empire, the Kingdom of Italy and the Third French Republic, all date from this period. Russia emancipated her serfs in 1866 and gave a series of reforms under Alexander II. The Balkan States developed nationalistic tendencies and wanted separation from the Turkish Empire. In 1866, Denmark's Constitution was made more democratic, while the King of Sweden granted a Constitution to his people. In the United States, the emergence of industrialism and a new economic order made a revolution inevitable at this time. In 1867 England passed the second Reform Bill, granting franchise to city dwellers, thus radically changing the form of her government. In the East, Japan awakened

to the need of a strong central government, and two hundred Shoguns surrendered their swords to the great Emperor Meiji, thus making him a ruler in fact.

DEMOCRACY

It was in this atmosphere of conflict and separatism that democracy took its birth. The printing press, cheap books and newspapers led to mass literacy and consciousness of power among the masses. The working classes demanded their rights which the owners of capital and machinery yielded slowly. Suffrage was gradually extended to the working man, and later to women. Written Constitutions, with the safe-guards of rights for the individual, came to be adopted. The cabinet form of government, based on sharply-defined party programmes, was introduced in European countries. Democracy is a creation of science and machine and conflict is its fundamental motif. The foundation of democracy is conflict and dictatorship its climax. As forces of conflict gather momentum in a nation from internal causes or as a result of impact from outside, its various institutions fall into line, one party gains ascendency over the rest, all opposition is hammered out, dictatorship gets into the saddle.

DARWINISM

These then were the repurcussions that science and its creation the machine produced on the life of the western nations. A new culture of industrialism, capi-

talism, nationalism and democracy at home and imperialism and racialism abroad, took birth. But there is a brotherhood between events and ideas. Events produce ideas and ideas give birth to events; the two invariably go together. Consequently, this new culture required a new philosophy and it found that philosophy in Darwinism. The bearing of Darwinism on the life of the West has considerable significance for the student of social institutions. The publication of *The Origin of Species* led to an unprecedented saturnalia of the western mind. It not only struck a severe blow at the prevailing theistic philosophies, but it gave a fresh impetus to geology, archaeology, paleontology, biology, botany, zoology. It gave a new orientation to physiology, anatomy and anthropology, while it compelled a reconsideration of the fundamental questions of economics, politics, ethics, psychology and sociology. All aspects of the life and the social institutions of the West came to be treated under the biological concepts of evolution, of selective elimination, of adaptation, of struggle for existence and survival of the fittest, of continuous change. Philosophical thought became re-oriented to the evolutionary concepts of Darwinism. Herbert Spencer became the St. Paul of Darwinism; he gave a most formidable system, complete in all its parts, to staggered humanity.

PHILOSOPHY OF FORCE

The Darwinian thesis of the struggle for existence

and survival of the fittest completed the revolution brought about in the western mind by industrialism, changed the attitudes of people, threw all their moral and spiritual values into the crucible. Evolution became the watchword of the West. Darwin's observation of the laws of heredity operating in the sub-human realms were quickly snatched and applied to human social life. Bagehot gave a brief and vivid summary of Darwinism in these words: 'If A was able to kill B before B killed A, then A survived, and the race became a race of As, inheriting A's qualities.' The inevitable result of this thesis was the glorification of force. Progress came to be conceived in terms of the use of force. The European universities accepted the Darwinian thesis, and the whole of education came to be based on this new philosophy. Benjamin Kidd, one of the greatest sociologists of all time, wrote of this right of conquest becoming justified and glorified by warlike and military organizations as civilization had never dared to glorify and justify it before'—'Soon after the middle of the nineteenth century and onwards, the history of the West takes on a new spirit. From this date forward, George Peel's terrible saying that history and homicide are indistinguishable terms becomes a truth pregnant with a meaning which it never possessed before in civilization.' In Germany, Nietzche wrote for the 'will to power' and invoked the Superman. His writings revealed the glorification of force in all its nakedness. He condemned Christianity as

'the greatest blasphemy in time, the religion which has chained and softened us. What have we to do with the herd morality which expresses itself in modern democracy ?...It is good for cows, women and Englishmen.' And he adumbrated his doctrine of the efficient animal man: 'A new table I set over you, oh! my brethren. Become hard. For the best things belong to us, the best food, the purest sky, the fairest women, the strongest thoughts. And if men do not give us these things, we shall take them.' 'The destinies of the German people are in the hands that hold the sword.' Thus spoke the author of *Thus spake Zarathushtra!* Sir Arthur Keith, a British scientist, endorsed this view: 'Nature keeps her orchard healthy by pruning; war is the pruning hook.'

EUGENICS

One of the natural offsprings of this Darwinian approach to life was the science of eugenics, with Galton as its prophet. The Eugenical Laboratories of the western world before the war were bursting with statistics to prove the validity of the Darwinian thesis and produce eugenical families, though much popularity does not seem to have crowned their efforts.

PSYCHOLOGY WITHOUT PSYCHE

When science could demonstrate its success in the realm of the phenomenal by controlling nature and reducing it to its supreme command, when all

manifestations of life and form come to be interpreted in terms of mechanics, the science of psychology could not escape the climate of the times. It became divested of the psyche; hence became reduced to a bundle of complexes. The most popular system of psychology was that of Psycho-analysis. It fostered interest in sex, in the psychology of dreams and in the inner working of the psychopathic mind. It received universal acclaim, bordering on worship, in all the western world. But it was forgotten that this universal phenomenon of mental derangement was also the creation of the pathological conditions prevailing in the rapidly rising cities, that the abnormal workings of the human mind and social conditions were obverse and reverse of the same coin. But the species of psychology with which I came in direct contact was that of Behaviorism, which was prevalent in American institutions. According to Behaviorism, man is 'an assembled organic machine, ready to run'. Language is 'laryngeal or verbal behavior'; 'intercommunication is sensori-motor interchangeability achieved through sensori—neutro-motor structure.' 'Institutions and standards result from conditioned linkage of acts and events to unconditioned avoidance and approach stimuli.' Emotions are visceral reactions; there is no such thing as will. Stimuli evoke response, and both together exhaust the explanation of man. Thought is the secretion of the brain. All men are equal in their native endowments. Reflexes

explain all human behaviour. In short, man is a machine, and science can reduce him to a system.

RACIALISM

From this, it was an easy step to distorted anthropology and ethnology. Success of science and political supremacy of those who could command the use of mechanized armaments led to the establishment of the assumed racial supremacy of the nations. A whole School of Anthropologists, led by Gobineau, Grant and Chamberlain, gave a benediction to this doctrine, while Hilaire Belloc summarized the differences between the various racial groups of Europe, in his usual humorous manner, thus :

'Behold, my child, the Nordic man,
And be as like him as you can.
His legs are long, his mind is slow,
His hair is light and made of tow.
And next him is the Alpine race,
Oh what a broad brutal face !
His hair is dark, his skin is yellow,
He is a most unpleasant fellow.
And then the lowest race of all,
Mediterranean we call
His hair is crisp and even curls,
And he is saucy with the girls.' [1]

1. Racialism is not a monopoly of the Nazis; it is at its worst throughout the British Empire; and discerning students of world affairs do not fail to detect, in the present policies of the western nations, seeds for a future racial war being sown now.

ECONOMICS

And we can go through other social sciences and see this all-pervasive conflict. Economics developed the ideology of poverty amidst plenty, concentration of capital, large commercial combines, cartels, and trusts, laws of supply and demand, destruction of nature's blessings, manipulation of prices for ever accumulating profits, gold-backed currencies, credits, stocks, markets, tariffs, quotas, exchange depreciations, price stabilizations, monopolies, control and clearing houses, imperial preferences, bilateral trade agreements, trade cycles, depressions, crashes and slumps, glutted markets, irregular employment, labour unrest, autarchy or oconomic nationalism, and finally, the tragedy of national planning ending in international chaos.

POLITICAL SCIENCE

The Science of Politics glorified strife. Arrogant, assertive nationalism, fictions of individual rights and state sovereignty, a decadent parliamentarianism based on party conflict, doctrines of socialism, syndicalism, guild socialism, nazism, fascism, communism, all seeking to subordinate the individual to the leviathan of the state, lobbying and jobbery among glorified gangsters misnamed statesmen : these were the chief themes of this Social Science.

PEDAGOGIES

Education became permeated by a pragmatic

philosophy, fostered by the political and the economic institutions of the times. Education became an agency of propaganda, a hammer in the hands of the party in power. Science was prostituted to serve the interests of the predominant group, to convert the thinking human beings into articulate animals, shouting slogans and shibboleths, with their mental integrity utterly dissolved, so that they were easily drilled to die and destroy. Education of little children was designed to follow in the footsteps of their fathers. Thinkers and scientists were forced to buy their security by selling their conscience and submitting themselves as bond slaves of the powers of the state.

PHILOSOPHY

The dominant schools of philosophy in Europe were those of Positivism, Naturalism, Determinism and Indeterminism, Experimental and Integrated Humanism, Dialectical Materialism, Individualism and Collectivism. Their significant features were a pronounced emphasis on science, supremacy of sense over other forms of knowledge, of reason over intuition, of individual over the group and *vice versa*, of class war and the materialistic and mechanical conception of progress. Unity was lacking; conflict occupied the stage.

ARTS AND LITERATURE

This disintegration of life became reflected in the

arts and literature of the West. Impressionism, Expressionism, Cubism and Futurism took birth, and now we have the sovereignty of surrealism. The artists reflected the chaotic mind of the age. New values were sought in the primitive arts, in the arts of children and of the psychopathic. The artists considered it a mark of greatness to be misunderstood; they delighted in deliberately surprising, even insulting, the public with their bizarre, unintelligible and fantastic productions. Here also was a subordination of Spirit, Subject, to Matter. Most of the literature of European countries was either erotic or neurotic. The age of the great writers who immortalized and idealized man's inner spiritual hungers, his sacred hopes and aspirations, had passed away, yielding place to the rebellious scribe of the criminal and the sensational. Current literary criticism has no philosophy, no scheme of values.

RELIGION

Religion became divested of its spiritual meaning and purpose, became a hireling of the 'nation' which it glorified with all its ancient, primitive, tribal ritualism at home and missionary machinery abroad. Religious experience, which is born of control of our appetites, and of inward withdrawal, of discipline and meditation, came to be considered as mere rationalization of man's private fantasies or manifestations of sex ecstasy in another form. Freudianism and Darwinism became

its fundamental tenets. That is why we witness the ungodly spectacle of blessings given by priests to battleships and bombers raining terror and destruction over innocent children and women on land and sea, and the Deans of churches holding stocks in armament factories! Some nations officially abolished Christianity; Germany has taken to the worship of her ancient primitive gods, Wotan and Thor.

SUMMARY

This brings our brief but overall survey of the impact of science on society to a close. But before we part, let us pause for a moment, gather up the threads of our argument and reduce our whole discussion of these kaleidoscopic changes and disparate events to some single, easily understandable principle, as it will help us to get a grip of the whole situation, and with its assistance, we shall be the better equipped to understand the trend of human destiny. This divorce between science and social values which India always denied and which the West strongly affirms has initiated an era of unmitigated conflict, atomism, analysis, antithesis, *adharma,* to use a Sanskrit word. Conflict is the keynote of the culture of machine and science. It is conflict between nature and man, between man and woman, between agriculture and industry, between capital and labour, between class and class, between village and city, between individual and state, between nation and nation, between race and race,

between religion and science, between life and form, between *purusha* and *prakriti*. The present is an era of accursed antinomianism, inherited from the time of the primitive Greeks. Had Europe followed Plato instead of Aristotle, its history would have been written differently.

But life is dynamic; its contrary forces of thesis and antithesis are in a ceaseless quest of synthesis. The forces of conflict and co-operation work side by side. The destruction wrought by anti-social use of science and machine is forcing man into the necessity of yoking them to service of his fellowman. The present armageddon, unparalleled in intensity of destruction and extensiveness of operations in the history of mankind, is the solvent in which many incongruent elements are in the course of dissolution and which will leave behind those parts which a return of sanity to mankind may put together to form a new pattern for the use of posterity. It is to this picture of the new world that science may help in incarnating that we shall turn our attention in our next lecture.

2. THE NEW WORLD OF SCIENCE

Not long ago there were gathered together near Nicholasville, a little town in the State of Kentucky in the United States, hundreds of farmers with their families. Four pall-bearers approached with a white casket which they lowered into an open grave. A funeral sermon was preached. But at the end instead

of mourning the spectators cheered loudly and a chorus sang joyously: 'Brighten the corner where you are.' The casket contained a kerosene lamp which was being given honourable burial. Electricity had come and was pushing this innocent anachronism out of existence.

ELECTRICITY AND SOCIAL CHANGES

Electricity had wrought a great change in this region. Thanks to the Rural Electrification Administration, 200,000 miles of lines had been built, and both the Administration and the public utility concerns were now serving 1,000,000 farms. Farms which formerly could raise only cotton now produced rye, barley and oats. Balanced agriculture had become possible through rotation of crops. Plentiful fodder made possible the raising of Guernsey cows. Tomatos and cabbage thrived on soil-heating cables. Electric refrigeration opened up possibilities of preserving food and vegetables. Feed grinders, chicken brooders, milk coolers came in. Electricity pumped water from the farm-well to the home. A farmer was thus saved the labour of hand-pumping sixty tons of water and walking a distance of four hundred miles per year! Electric wash-machines relieved Mrs John Smith of the drudgery of the weekly laundry. Cooking by electricity became a joyous ritual. Saw-mills, sugar-cane presses, grist mills, feed-mixing plants and cheese factories grew up. Telephones knit the scattered and

isolated farms into communal life. In short, electrification changed the whole face of this region. Land, plant, animal and man were all profited. An era of mutual harmony and balanced relationships was born; a new rhythm of life had set in.[1]

CULTURE OF THE KEROSENE LAMP

Let us go into the sociological implications of this change. The kerosene lamp was a symbol of a social order which consisted of scattered and isolated farms, with no means of intercommunication; with poor lighting, dirty kitchens, drudgery of cooking on open smoky stoves; washing with hands, heavy labour and waste of time in getting water from the farm-well at a distance; primitive one-crop agriculture, poor soil, absence of industries, poor housing, poor food and poor health; low incomes, lack of leisure, drain of all products to the city markets. All these were of a piece and fitted together. But with the advent of electricity, everything changed. Electricity brought power, *shakti*, and transformed every aspect of the life of the community. A new human ecology, a social order of harmony, health and happiness for all, emerged. Electricity, a symbol of the progress of science, had proved itself to be a friend, not an enemy, of all sentient beings.

NATURE OF CULTURAL CHANGE

From this we deduce a principle: that the different

1. Huxley, Julian, *TVA Adventure in Planning*, The Architectural Press, Surrey, England, 1943.

parts of a culture—and by culture we mean the totality of associated life, folkways, traditions, customs, instruments, work, play, education, government, law, business, religion, art—fit together into an organic whole; and the advent of one cultural trait, subjective or objective, from another region will affect the entire range of social relations and initiate an era of all-inclusive change, till the various aspects of life have found a new adjustment among themselves. The wheel of change being set in motion, the whole of life must be re-formed, re-arranged. Life is an organic whole; what affects one part, affects the whole.

PERIOD OF TRANSITION

Secondly, this new accommodation implies an era of unsettlement, a period of maladjustment, transition. When two traits of culture, the kerosene lamp and electricity, come face to face, one of the two must win by virtue of its superiority in usefulness. History records many examples of such period of cultural change on a much larger scale. India has gone through tremendous social upheavals, since she was the first to undertake scientific and philosophical investigations, as we saw in the previous lecture; and every new invention and idea sent its repercussions through her whole social fabric. Buddha's teachings, for instance, changed completely the cultural contours of India. In Europe, the transitional era of Greek culture, extending from the time of the early philosophers to the time

of the Stoics; the era that witnessed the disintegration of the Roman Empire and the birth of Christianity, ending with the Middle Ages; the Renaissance, followed by the Industrial Revolution and the present age — all these eras of transition reveal one common feature: a general breakdown of traditional ways of life and thought, a universal upheaval in the whole social setting. Ceaseless commotion and questioning surge through the hearts of men; demand for change becomes insistent. Change is recognized to be the nature of life.

PLANNED SOCIAL CHANGE

But there is a third principle of tremendous social significance which the transformation in Nicholasville presents to us, and it is this: that *social change can be planned*, that impact of science on society can be predicted and directed along predetermined channels of human welfare. Social change need not happen at random; it is amenable to human reason, intelligence. A synthetic vision of the numerous processes of social life, an intelligent perception of their interlocking and their guidance along lines of social betterment, form the core of *dharma* and of *karma yoga*, of the philosophy of the new age that is emerging in our midst.

PURPOSE OF THE LECTURE

The scientist of today is busy creating visions of this new world, dreaming of the City of God in which man shall not be a 'god in exile', but at

home with himself, with the universe and with the mystery of the Great Life. In laboratories all over the world dedicated to research, the votaries of various sciences are engaged in the work of building their respective portions of this new world; and we shall attempt to assemble the scattered contributions of science, and catch a glimpse of the world-to-be. Our concern shall not be an investigation into the technical researches; that is work for the scientists. Our concern shall be with the application of science to the problems of daily living, with the social consequences of these researches and inventions, and with their significance for the world which they will precipitate into incarnation in the near future.

ENERGY AND PRODUCTION

Let us begin with that phase of life which ushered in a new age in Nicholasville, the age that gave an honourable burial to the kerosene lamp and brought in electricity, energy, *shakti*. We are now in the world of *shakti*. We speak in terms of horse-power. Science is refining continuously the techniques of producing this energy, reducing the cost to a mimimum. In 1903, for instance, 6,888 pounds of coal were required for a kilowatt hour of energy; in 1933, it was 84 pounds. Calculated in terms of energy, a man can accomplish work equal to one-tenth of one horse-power. But, today, we have single engines or turbines rated at 300,000 horse-power, which is equal to 3,000,000

man-power; and if this turbine worked for all the 24 hours, instead of eight as the man does, it would generate energy equal to nine million men! Till very recently, a man could dig one-eighth of an acre in a twelve-hour working day. That meant 96 man-hours of labour per acre. Today, with the large tractor-drawn discs of duck-foot ploughs of modern farming, we have reduced man-power to .09 per acre. This is a thousand times increase on the primitive agent. A shoe-maker takes about 5 days to make a pair of shoes, and 7,200 shoe-makers can make 7,200 pairs of shoes in five days. The same number of employees in a modern shoe-plant can produce 500,000 pairs of shoes in five days. Brick-makers have never attained an average of more than 4,500 bricks per day per man, a day being twelve hours or more. But today a modern straight-line continuous brick-plant will produce 40,000 bricks per hour per man. If India had 1,000 such plants, with 1,000 men working for eight hours in each, every family would have a house at its disposal in one year. Our village millers grind out between milling stones not more than 3 maunds of flour per day, with a camel doing the rounds. But in a modern flour-mill, a man can turn out 30,000 barrels or 60,000 maunds per day, with a much shorter day and better flour too. One modern automatic baking machine can produce 6,500 pounds of bread per hour, or 52,000 pounds per day, feeding 100,000 human beings. 4,000 such bakeries, scattered throughout

India, would feed the entire population! A man would be doing a good day's work if he moved, with a pick and shovel, two cubic yards of earth in a ten-hour day. But an electric steam shovel can pick up eighteen cubic yards every time its jaws bite into the ground. In 1930, one man could turn out as many needles per day with machinery as it took 17,000 men a century ago. A century ago, in the United States, a man could produce 50 tons of pig iron per year and mine 800 tons of iron ore. In 1929, the modern blast furnace made it possible to produce 4,000 tons of pig iron per man per year, and mine iron ore at the rate of 20,000 tons per man. Every day, we see new methods of release of energy. We know not what the release of the titanic energy locked within the infinitely small compass of an atom will accomplish. Scientists maintain that it will be possible to take a 100,000 ton Atlantic liner from Europe to America and back on the energy of one tumbler of water! In terms of man-power, it would need over ten million oarsmen to do the job. Examples can be multiplied *ad infinitum*.[1]

PHOTO-ELECTRIC EYE

But science is giving us not only new engines that occupy less space, consume less, and produce more energy, but also perform numerous tasks without man's attention at all. The photo-electric eye is one

1. See writings of the eminent American economist, Thornstien Venblen and the literature on Technocracy.

example. The various tasks that this eye can perform are worth mentioning. It records the sound of the talking machine. It detects smoke or fire in a house, opens the door as you enter, switches on the lights when it gets dark, gives a signal at the approach of a stranger to the house, sounds an alarm if the house is being robbed. It controls speed traffic, gives accurate data on traffic on the highways. It counts pills and fills bottles; matches colours with phenomenal rapidity and infallibility; inspects finished goods in factories, rejects faulty products, measures with accuracy to a hundred-thousandth of an inch, counts cross-wise threads in fabrics at the rate of 10,000 per second. It separates ripe oranges from green, brown eggs from white, small pebbles from beans. It dims the lights of your car as it approaches another in the opposite direction, watches over patients in hospitals, applies huge scissors to cut long, moving strips of steel in plants. It performs numerous operations displacing human labour and expensive machinery.

ELECTRONIC MICROSCOPE

One of the most exciting prospects on the horizon is the electron microscope which raises magnification to unbelievable limits. With ordinary light, you can magnify an object to 2,500 times its normal size, perhaps a little more with ultra violet rays. But with the electronic microscope 10,000 to 30,000 magnification becomes possible, and this shoots up to 200,000

to 300,000 with photographic enlargement. This invention will help us to make new discoveries with regard to the structure of matter and to bring under control some intractable diseases.[1]

MINING, SEA-MINERALS, ALLOYS

Let us undertake a rapid survey of innovations in various aspects of life and institutions as a result of scientific inventions, and try to paint a picture of what is likely to be. We begin with mining, since metals are of primary importance in this age. The whole technique of mining is undergoing transformation. Instead of the present-day method of cutting rock, working underground under dangerous conditions, digging and conveying the ore to the surface, scientists are introducing open-cut mining by means of improved techniques of blasting, and the gigantic shovels just mentioned, converting the seams of coal underground into oil and gas by means of controlled fires and bringing up the deposits in liquid form, thus reducing the mining operations to mere drilling and pumping. Processes of chemical extraction may eliminate the necessity of deep mining and make available, at the same time, the metals found in sea-water. Indeed, this latter process is well on the way already. Magnesium, which is about three-fifths the weight of aluminium and one-fifth the weight of steel, is indispensable in modern technology. Half a ton of it goes on an average

1. Burton and Kohl, *The Electronic Microscope*

into every fighting plane. Its cost before the war was Rs. 15 per pound. But now this structural metal is extracted from the sea by a chemical process, and the price is only seven and a half annas a pound! In the United States, many extraction plants have been set up on the sea-coast; in one of them, huge pumps force 300,000,000 gallons of water daily through intricate apparatus, leaving magnesium behind. Sea-water is said to contain many other metals which will also be extracted in the near future. Electrical methods of heating and low-temperature production of iron, with methane and hydrogen as the reducing agents, are introducing processes less wasteful of heat. Research into the molecular structure of minerals has already given us, according to a report of the Automotive Society of America, 100 alloys, lighter, stronger and with more properties. There is a possibility of controlling corrosion of metals.[1]

PETROLEUM CHEMISTRY

Recent researches in petroleum chemistry have precipitated changes in motor-fuel technology, the effects of which will be evident after the war. Fuels beyond the octane scale are being made now. Triptane is one of the achievements of today. With the aid of this powerful gasoline, which is really another hydrocarbon, an airplane can rise from a much shorter runway, go faster, climb higher, manœuvre more easily and go farther than with any other fuel yet developed. The

1. See *Mining and Engineering Monthly*, Albany, New York.

petroleum chemists maintain that all the existing motors will be out of date after the war. Crude oil is made to yield, with the addition of oxygen and other elements, new alcohols, esters, acids, solvents, perfumes, pharmaceutical and organic synthetics of various types, With equal facility, the petroleum chemist can give us ethylene and benzene measured in hundreds of tons daily. 'It is like drawing water and wine from the same cask.'

TRANSPORT

Improvements in transport and communication are drawing the world closer. Small, efficient, foolproof aeroplanes at low cost will be available for every family after the war. Automobile engineers are thinking in terms of hemisphere-spanning freighters and of passenger air-carriers in fleets numbering hundreds of planes. Trans-continental non-stop air-trains of gliders, which will be able to drop and pick up coaches over cities while in transit are no figments of imagination. Some of the modern juggernauts of the air have a wing span of 250 feet, the tail stands 43 above the ground; they can carry enough fuel to fly from New York to Berlin, circle over the city for six hours, and fly back to New York without the necessity of refuelling.[1] The automobile manufacturer has wiped his slate clean for a fresh start after the war. The new car will be far more efficient than the present one.

1. *Scientific American*, 'Tomorrow's Air Transport Planes', October 1943, pp. 154–6.

The new type of combustion-engine will occupy as much space as your shoe-box! The sealed cooling system will do away with the nuisance of adding water to radiators; the weight of the car will be considerably reduced. On the same principle, trains will be lighter.[1] The quantity of steel required in transporting a passenger will be reduced by many thousands of pounds. Trains have already attained a speed of 100 miles and run on time. Some of the remotest parts of the world are already being opened up to railway communication as a result of the impact of the present war.

PLASTICS AND SYNTHETICS

Industrial chemistry has started an era of plastics and synthetics. Dried bagasse, ground into powder, treated with various chemicals till it emerges as a granulated product, can be shaped into hot steel moulds under pressure of 3,000 pounds to the square inch. The resultant product is sprayed into various forms, looks like highly polished black vulcanized rubber, 'stands a bending strain up to 13,000 pounds, is unbreakable under the impact of extraordinary use, is a non-condutor of heat and electricity, is acid resistant, so fireproof that contact with any flame of less intensity than that of a blow torch cannot set it on fire or even leave a mark on it; it can be laminated like shatter-proof glass. Strips of it, welded together

1. *Scientific American*, 'Motors do a better job'.

by heat and pressure into masses of light, strong, incredibly tough material can be machined like a block of steel.'[1]

CITY GARBAGE AND SEWAGE

The high-pressure synthesis of ammonia is one of the major exploits of the present century. The amount of fertilizer chemicals that will be available for the farmer may change the basic trends of agriculture all over the world. Chemical industry is aiding the recovery of things discarded by man in large cities. One year's garbage in a city was worth twenty million pounds, roughly the cost of ten merchantmen of 5,000 tons each.[2]

HOUSING

The new houses are more comfortable and beautiful places to live in than those of today. They are made of prefabricated materials, standardized and made on mass scale, cheap, proof against nature's wrath — fire, storm, earthquake, or termites. Science controls their internal temperature, cooling them in summer, warming them in winter. The plasticity of poured concrete, the lightness and strength of architectural steel, and the development of glass as a building material will open up new vistas in architecture.

1. New York Times, Literary Supplement, July 27, 1941 ; J. H. Dubois, Plastics Parade, *Scientific American*, October, 1943, pp. 163-65; Mansperger and Pepper, *Plastics—Problems and Processes.*

2. *Scientific American*, 'Utilization of City Sewage', Sep., 1943

The application of aero-dynamics will come in for considerable development after the war. Our world will present a different picture when its present two thousand millions are lodged in houses beautifully designed and equipped, able to stand the shocks of nature, having spacious courts in front, home-gardens in the rear, supplied with all the comforts and conveniences now reserved for the rich.[1]

Nor has the problem of clothing escaped the attention of the scientist. Air and water and earth are yielding silk that offers competition to the natural product. Wearing apparel made out of glass is a proud and practical achievement of science. Nylon goods are already on the market. One factory alone sent out, before the war, 35 million miles of glass thread one-fifteenth the diameter of human hair, to be woven into dresses, curtains, cushions, electrical insulations and for insulating houses! Science is dispensing with the whole process of manufacturing clothes from fabrics by making them directly from porous plastic materials, thus leaving us alone in India to spin yarns about spinning yarn! It will be possible to wear new clothes for a few days and then discard them entirely, and thus be saved the necessity of frequent washing and cleaning. We shall have greater variety and beauty in the matter of clothing within the means of everybody; and the land thus released from growing raw material for fabrics will be used for purposes of agriculture.

1. *Scientific American*, 'A House in Six Hours,', June, 1943

CREATIVE LEISURE

Relieved of drudgery and monotony of work, man is turning to creative use of his leisure. The whole philosophy of constant work with which the world is afflicted smacks of unconscious vampirism and is responsible for numerous nervous disorders. People are afraid of leisure and solitude. Therefore, they seek momentary satisfaction in passive, vicarious enjoyment of sports, radio and cinema, the last of which stimulates their fantasy, encourages wrong thinking, feeling and action. But with electricity at man's disposal, he is able to turn his attention to numerous hobbies and handicrafts and imprint the cunning of his hand on his creation. When not obsessed with the motive of profit or praise, his flight into the upper regions of beauty will be quicker and more conscious, and the world will have great artists, instead of the present-day neurotics who dip their brushes into the unconscious and desecrate the name of Beauty. Man, living a life of harmlessness, free from toil, with all his inner forces and vitalities well integrated, away from the dehumanizing life of the cities, will be received by nature as a friend and given initiation into its mysteries which will make him one with the universe and his fellowmen..

RURAL PLANNING

The engineer is planning a more beautiful countryside, clean, with roads, bridges, tunnels and buildings built as a co-ordinated unit. Reclamation of land on

a large scale, extensive irrigation schemes, landscaping, water-power production, are all in his calculations. In reconstructing the present tattered world, where people dwell in filth and squalour, the engineer's work will be of inestimable value.

DECENTRALIZATION OF THE CITY

The cities of tomorrow will not be the mad-houses that they are today. Noise which corrodes the life of city-dwellers is being eliminated by sound-proof walls; smoke which poisons the atmosphere is utilized for other purposes. The present-day vertical ascension symbolized by tall edifices, is already giving place to horizontal expansion, with new satellite towns all around into which the cities pour their workers after the day's work is done. Decentralization of cities, involving separation of industrial, financial, commercial, transportational and educational functions, has a high strategical and cultural value. Aerial bombing of cities, which are the nerve centres of civilization, can throw nations into dark ages. Decentralization gives opportunities to workers to have fuller and richer contacts with their families, their neighbours and nature. Decentralization makes for an enhanced sense of civic responsibility. Urbanization is not essential to industrialization. Crime and social diseases will not arise, since there will be no second-hand life of cities that fosters them. The new culture of the country will help man to integrate the inner forces of his nature

and focus them on the main problem of his being, which is a richer life of the Spirit, lived in service of society.[1]

CONTROL OF DISEASES

Some of the malignant infectious diseases are being stamped out of existence. We need not go into the sulpha miracles. Plague, cholera, pneumonia, tuberculosis and cancer are being brought under control. Tooth decay is stopped with certain bone tablets; hyper-tension or blood-pressure, a disease of civilization, yields to a simple operation controlling the little arteries of the organs in the abdomen. The possibilities of using chlorophyll for various diseases are being explored. Development of chemistry and physiology are aiding the manufacture of efficacious drugs useful for control of physical and mental disorders. Administration of insulin shocks and gland-extracts for mild insanity are now common. Influenza extract, developed in the Rockefeller Institute, New York, is proving helpful. Synthetic quinine is doing away with our dependence on cinchona trees.

FOOD CHEMISTRY

A great revolution is brewing in food chemistry and industry. We are all acquainted by now with vitamin theories. Dehydration is playing a great role in combating the food problem of the various parts of the world. The dehydration process preserves the

1. See research conducted by Wharton School of Business Administration, University of Pennsylvania, Philadelphia, U. S. A.

food from decomposition, is far more economical than canning and bottling, eliminates the problem of bulk transportation, releases the pressure on metal needed for canning and carriage. A new type of yeast produced at phenomenal rapidity is about to upset the world's food economy. A research geneticist at Washington University, St. Louis, Missouri, has developed yeast in a variety of flavours resembling staple food. 125 pounds of yeast in a vat containing 7,000 gallons of water, a ton and a half of molasses whose sugar feeds the yeast, and ammonia which provides nitrogen that converts yeast into protein, is stirred by 1,000 cubic feet of air a minute. After 12 hours, the rapidly growing yeast, having multiplied its original weight sixteen times, is a ton of flavourous food. It is the cheapest and quickest way of growing proteins for mass consumption. Meat is five times as costly and takes two thousand times as much time to raise! And, so, we can go through numerous other developments that will ensure the nourishment and health of mankind.

NEW AGRICULTURE

There are two advancements in the science of agriculture that need to be noted here: soilless agriculture and colchicine treatment of seeds. Soilless agriculture may yield to large-scale application by the nations, enabling them to 'stay home', as Dr Wilcox maintains.[1] With the help of this technique, an average

1. Wilcox, *Nations Can Stay Home*, Norton, New York

family will be able to grow its yearly supply of food, vegetables and fruit, in its backyard; a nation depending on other countries for its food supply will be able to raise its own agricultural requirements. Dependency will give place to self-sufficiency.

COLCHICINE

The colchicine treatment is another significant contribution of science that agriculture is pressing into service. When rubbed on the bud, injected into the plant, or used in a bath, colchicine produces amazing results in growth and influence on heredity. It gives rise to new varieties with rapid frequency, whereas mutations in nature are slow and rare. Hybrids known to be sterile become fertile under colchicine treatment. It affects the plant's chromosomes governing heredity. When a plant is treated with colchicine, the number of chromosomes in each cell doubles. This introduces a change in the offspring, which differs from the parent in size, vigour, resistance to disease, etc., and these changes become hereditary. Colchicine is said to affect animal tissues, but at present only in inconclusive laboratory experiments. Vernalization is one of the proudest achievements of modern science.

Thus, scientific cooking of food and storage, transportation to regions deficient in supplies, soilless agriculture, colchicine treatment of seeds, scientific manuring, mechanized agriculture, modern flour mills, electric bakeries, increased supply of proteins, control of

disease, socialized medicine, are already working in full blast in some countries, will spread to other parts of the world, simplify the problem of raising food, relieve humanity of its drudgery, feed the starving millions and ensure the health and happiness of mankind.

Some of the latest advances in the field of genetics make very interesting study. It is now claimed that bombardment with X-rays can alter or destroy the genes which are the source of variation in the character of the organism of the descendant. This means that the scientist will be able to control the mechanism of evolution. The evolutionary process is slow; the scientist, by grouping the 'linked' genes, is able to hasten the process. You may cut off the stings of 1,000 generations of bees, and the 1001st generation will still have stings. But if you destroy the sting-producing genes and inbreed, the descendants will be stingless for ever; and every human family can have its supply of honey without any one getting stung any time!

OTHER INVENTIONS

Thus, working in the vast field of research, taking as his domain all things open to analysis and observation, the scientist has extended his investigations from the interior of an atom to that of the galactic system. In the first third of the present century, 1.330,000 patents were issued in the United States of America alone! Television, cameras recording lightning flashes and taking pictures in the dark, petrol made from water,

photographs sent by radio, machines that perform mental operations, solve problems ranging from the simplest algebra to dynamic equations of the solar system, record telephone calls, administer anaesthetics, synthetic rubber, anti-knock fuels, special lubricants, lacquer coating, lamps that will drive away all moths round your camp at night, wind-mills generating electricity, clocks that wind themselves by changes in temperature, explosive rivets—all these labour-saving devices are available today. A simple attachment to your radio set will print you a complete newspaper in your home while you sleep. Dr Ernest O. Lawrence's Cyclostron, the huge atom-smasher, has transformed platinum into gold and given off more radio-active particles than the world's entire supply of radium.[1]

Glass-ware for cooking is on the market and is increasingly releasing aluminium for other purposes. Use of substances such as iodine, calcium, phosphorus and others, charged with radio-activity, is proving efficacious in curing cancer, diseases of the bone, etc. A cotton-picker, giving an average of 1,100 pounds per day, has been held back lest it may result in serious unemployment in the southern states of the United States of America. A tele-typesetter may erupt into universal use if the war continues and keeps making demands for hands. New applications

1. Robertson, John K. *Atomic Artillery*

of cathode rays,[1] are no longer laboratory dreams. Paper is made from common hay and corn-stalks, sugar from saw-dust. There are numerous other inventions that have not been put to commercial use because of the opposition of governments, industries and labour, or because the natural products are still easily available.

NEW ECONOMICS

From this rapid survey of the latest developments of science, we turn to the new trends in economic and political thinking that have come upon mankind, for, for this new world of science the economic and political ideologies that have made a shambles of the world cannot hold water. The past and the future cannot go together. The economics and politics of the kerosene lamp and of electricity are not the same. It is therefore necessary to give a passing look at these new trends to complete the picture.

According to the new economics, the price system is based on the assumption that human labour is essential. But that is no longer the case, as we have seen

1. According to a recent communication from U. S. A., plans to revolutionalize wireless telegraphy by flashing complete typewritten pages at 25 pages per second anywhere in the whole world are being perfected. At present pictures equivalent to one page take six to ten minutes to transmit. It is now proposed to increase the speed of this photo-telegraphy 15,000 times, so that books or newspapers could be radiated in their entirety in a few seconds. Transmission of entire newspapers with the aid of cathode ray tubes is only one of the developments on the horizon.

already. Machine has supplanted man. It is the distributive system, based on pecuniary standards, that is the major cause of misery. Further, debt is considered to be a purely fictitious time. Funds are a pecuniary fact, not an industrial fact. Money is a pliable yardstick and highly unscientific. Price and value rest upon old theories of political economy; they have no real causal relationship with the measurement of commodities. We can see this easily in the rise and fall of agricultural products and income. For instance, the farm income of America, during the period of fall in prices, went down to one-third. Yet in terms of actual physical measurement, the farm output had almost doubled the pre-depression output. We might rationalize the whole thing in terms of functions of money and price system, but after it has been rationalized, it is still an item of pure arithmetic. We do not think of the farms waving up and down; they do not.

According to this industrial economics, the whole of the profit system is obsolete, and we are seeing this every day in our lives. A monetary profit system implies an ever-expanding market, so that there should be no decline in the rate at which output and profit increase. Such markets do not exist—backward countries are industrializing; and there are no possibilities of continuous payment of dividends reinvested in industry.

Thus, with the energy derived from natural resources, with the dispensing of human labour in production, with the discarding of finely spun theories of

price, value, debt, profit and money, the major planks of Marxist philosophy such as class war, dialectical materialism and violent revolution, become mere matters of academic interest, and Marx becomes deserted even by his most loyal and best exponents !

You will, thus, see that unless our own schemes of national planning are thoroughly informed by and oriented towards these changes being wrought by science in industry and economics, they are in danger of degenerating into mere statistical juggleries and clumsy clowning of the capitalistic class.

HUMAN RIGHTS VERSUS DUTIES

Accompanying these developments that are changing the very foundations of modern civilization, this new economic ideology that is leading to the discarding of the classical theories, there is taking place another change of tremendous social significance, and that is in the realm of political thinking and in the conception of the functions of the state. Today, it is a very far cry from the Philosophy of Natural Rights to the utter annihilation of those rights in practically every advanced country of the world, as a result of exigencies of war. This philosophy of right, of the individual's right to food, shelter, property, occupation, means of livelihood, intellectual pursuits and of life itself, is being hammered out of existence. In the present times, the kind and quantity of food that we shall eat is determined for us; the poor and the rich are treated

alike in the matter of rations. Families are moved out of their ancestral homes if enemy action has rendered them unsafe, or if they are required for strategical purposes or military occupation. The right of property is so thinned out by nationalization of resources and heavy taxation that nobody knows what he owns. Man's right to employment is entirely subordinated to the demands of society, represented by the State. Keeping the home fires burning may be a pleasant and important duty of the woman, but the country may need her to keep fires burning in a factory, a mill, a hospital or in a tent with an advancing army. Today, a man must read what is given to him in the papers, and that is not much after it has passed through the sieve of the censor. Shortage of paper has put an embargo on new publications. Control of prices of various commodities and transportation has come to stay. Finally, the very right to life itself has disappeared in thin air. The State prescribes the age-limits when it shall spare or commandeer the life of the individual. From the sociological point of view, this snuffing out of this atomic, arrogant, 'rugged individualism' that masqueraded as 'the uniqueness of the individual' is one of the greatest blessings that could have come to mankind out of the present carnage. This doctrine of laissez-faire is as dead as the dodo. A new philosophy of duties, of social integration, of subordination of the parts to the claims of the whole, of *loka-sangraha*, is in our midst now.

WORLD VISION AND 'THE COMMON MAN'

But this corporate type of thinking and living does not seem to be in danger of repeating the error of the past, of deification of the 'Nation' and the 'State', the most dangerous entities that have claimed man's allegiance during the last century and a half. As we saw in the previous lecture the birth of the Nation and the sovereignty of the State led to the carving up of continents, the building up of empires and periodic holocausts of blood and flames among the conquering nations of the West. But there seem to be signs of their recovering some sanity, and these two dangerous creations of the past are in course of being discarded in favour of something that transcends both, and that is humanity. Throughout the civilized world today, schemes for replanning human life have gone beyond the stage of speculation and have entered the realm of active formulation. We now speak of a World Bank to control international exchange and inflation of a world currency; of a World State, supported by its police and army; of a World Court; of international supervision and development of colonies, dependencies and empires; of world control of raw materials; of mutual exchange of natural resources and finished commodities; of world integration of civil aviation. Everything is on a global scale. Science and machine which, in their uncontrolled condition, ranged nature, mankind, sexes, classes, nations, races, religions, and science in opposite camps, have

brought all these together in one vast embrace of universal, human ecology of interdependence and comradeship. There is being enacted before our eyes today one of the most heartening and thrilling episodes in the drama of human history. The cosmic vision of the Vedic Seers—'All is one'—is being literally fulfilled, with the help of science, its processes and products. Never before has 'the common man' been inspired by such a vision as now. India, which has been the birth-place of this vision, of this Sanatana Dharma, the Eternal Wisdom of the One, has a great contribution to make. Where she stands today, how she can press into service these rich gifts of science for revitalizing and spiritualizing her own life as well as of the world, will form the thesis of tomorrow's lecture.[1]

1. There are two forks in the road before mankind today: either it must plan its life along the lines indicated herein and rise 'from glory to glory', or it must hug to its breast its old ways and be plunged into endless chaos once again. The latter possibility is envisaged by an English author thus: 'I, certainly, do not regard with enthusiasm the bleak world of robot efficiency which it suggests. But signs are not wanting that such a world is possible and even probable. Among such signs is the most unconscious growth of regimentation and brutalisation; the failure of the Christian Church; and the excessive preoccupation with material success and material welfare, a preoccupation to which the Christian Church and socialism generally have both fallen victims. If mankind, driven by the Industrial Machine, Big Business (under the guise of prosperity) and Advertisement (under the guise, as Max Beerbohm put it, of "all for each and each for all"), into atheism and a cut-throat race for wordly success and power, travels further and further as it seems to be doing, from all conceptions of the spirit, then the super-states, and the wars between super-states, must come, until, at last the world is unified by force and slaughter under a caucus of bureaucrats and technicians who will rule and regiment the servile millions, and realize on universal scale the dream of Hitler.'—Lionel Fielden, *Beggar My Neighbour*, p. 13

3. SCIENCE AND INDIAN RECONSTRUCTION

INTRODUCTION

History presents but one example of a nation that can lay bare its living soul and allow us to read on it the script of time. That nation is India. India that touches acknowledged history at 3,000 B. C. and whose story is still being written! Ancient, yet ever youthful; many, yet ever one; a nation whose life is rich in variety, in depths and heights. Contemporary and teacher of ancient civilizations in the East and the West, she has survived them all, while their wrecks lie scattered along the shores of history and their past is being reconstructed with the pick-axe of the archaeologist. India still lives. Her archaic language, Sanskrit, is still spoken and written; her ancient literature is still studied, her philosophies still hold sway and move men's minds, her treasures of art still stand, and her social institutions reveal age-old continuity. India has defied death and decay.

INDIA AN IDEA

The secret of India's history is her philosophy in action. It is more than a mere narrative, a record of battles and victories of some of her heroes and conquerors that have flitted across her stage. Her life is not merely 'the past anecdotally organized, episodically expounded'. It is a continuous becoming. It is the manifestation of India's message, the idea that

is constantly seeking to fulfil itself through her social institutions, her philosophic pursuits, her scientific and artistic achievements, her spiritual aspirations and her cultural conquests. Great personages, prophets and poets, sages, and saints, statesmen and scholars, are an outward symbol of her inner greatness. It is in this light that we should try to understand India.

GEOGRAPHY AND NATIONALITY

India's geographical position has contributed in a very large measure to the development of her nationality. The high mountain ranges in the north, extending from Burma to Baluchistan, have kept guard over her plains and held back the hordes of central Asia from swamping the country. The low hills on the eastern and the western coasts of her southern plateau, girt by the seas, have afforded protection as well as given sufficient contacts with other countries. Surrounded by nature's high walls on all sides, India has had 'sufficient open doors', so that while she has remained a mistress of her destiny at home, she has also kept up her political, commercial and cultural contacts with the outside world.

FUSION OF RACES

Wave upon wave of various ethnic groups have entered her plains from time of time. She has served as a great crucible and fused them all beyond original recognition. Natives or invaders or settlers, rulers

or ruled, they have come and mingled here freely. India has assimilited them, owned them as her children so that a specimen of racial purity would be an anthropological impossibility in India. But the fusion was kept within limits. Its slow and ordered progress enriched cultural and spiritual life. The present-day cleavages of communities are cultural, not racial.

FELLOWSHIP OF FAITHS

India gave birth to three great religions of the world, Hinduism, Buddhism, and Jainism. She gave shelter to Christianity earlier than Europe, and without any persecution; later to Zorostrianism. Islam came with one prophet, one book—and a sword dedicated to both, but India's inherent genius for unity offered it (Islam) a stern resistance through Sikhism.

INDIA'S MISSION

Thus, fate called India to one purpose and nature fashioned her for its fulfilment. That purpose is geographical, social, cultural and religious unity, oneness, co-operation, wholeness, synthesis, or to use a Sanskrit word, *Dharma*. Dharma is that which holds together. It is the law of the universe, it is eternal (*sanatana*). It governs the entire world of life and form; it holds the planets in their orbits and makes the universes run. India was entrusted with the task of proclaiming this Law of Synthesis

and demonstrating its practical application in every aspect of life. She did not deny any terrestrial existence, nor did she deify it. India was named Bharat Varsha, 'the land that embraces all', and her message was *Sanatana Dharma* that holds together all manifestation of life in ordered unity. Every aspect of India's life, therefore, aims towards this one purpose, the gathering up of the many into the one. Her great men, in times past and present, have dedicated their lives to the discovery of this one great *rahasya*, secret, and helped to build up her civilization. The lights of the universe burn low if India should fail in this her cosmic mission.

CULTURAL ASSAULT ON INDIA

During the last 200 years or so, within which the periodic swing of the pendulum carried power to the western world, India has been drawn into the vortex of world politics, and she has gone through an upheaval that has changed the contours of her cultural life. Today, India stands face to face with science and machine that have initiated an era of universal change. Even outsiders have realized the essential character of the problem that confronts this country. In his opening address before the Jubilee session of the Indian Science Congress, held at Calcutta in Jannary, 1943, Lord Linlithgow, the then Viceroy of India, closed with the following remarks: 'It is not for me to remind you that India is in a transitional stage, and that she

is on the threshold of a new era. With the march of years there has come the inevitable impact of the West, and India today is engaged in the welding on to her old structures of the newer political and economic forms of the West, on the finding in her intellectual life a place for the discoveries of science with all their challenge to accepted modes of thought and practice... Even the most enthusiastic believer in western civilization must feel today a certain despondency at the apparent failure of the West to dominate its scientific discoveries and to evolve a form of society in which material progress and spiritual freedom march comfortably together. Perhaps the West will find in India's more general emphasis on simplicity and the ultimate spirituality of things a more positive example of the truths which the most advanced thinkers in the West are now discovering. Is it too much to hope that you, gentlemen, will be the channel through which India will make in an increasing degree that contribution to western and world thought which those of us who know and love India are confident that she can make in so full a degree?' Yes, India is engaged in this task of synthesizing her own and western culture; but it is an age-old problem for her. Synthesis is India's 'manifest destiny'.

TRANSITION

There are two points to be noticed about this period of transition through which India is passing. While

the Industrial Revolution is coming to a climax in the West, which is being hammered into shape for a new social order, India is still in the early stages of such a transformation. Science and machine are still in their infancy in this country. Secondly, all our institutions, economic, social, political, educational, religious and cultural, bear the marks of the impact of science and machine and reveal points of stress and strain. In order to be able to devise techniques by means of which India may be able to press science and machine into her service and reconstruct her life in terms of her national ethos and for the welfare of humanity, it will be necessary to discover those points of strain. We shall turn to a brief elaboration of these two points for the moment.

BACKWARD CONDITION OF SCIENCE AND TECHNOLOGY

Many causes have conspired to keep India in a backward condition as regards the advancement of science and technology. Rapid advances in these two spheres in the country of the foreign rulers necessitated the introduction of policies whose avowed purpose was to eliminate competition from their colonies and dependencies, to make the latter produce only raw materials for manufacture at home, and to give protection to their trade and commerce by high tariffs and state subsidies. These policies found expression in active opposition to growth of scientific knowledge and industry in India. As late as 1910,

Lord Morley, then Secretary of State for India, was manifestly opposed to any encouragement from the Government to Indian industry. The Governments of India, Central and Provincial, bought British goods in preference to Indian. Indian capital was shy. Scientific knowledge, technical skill and industrial leadership were lackig.

Education reflected the intentions of the rulers. Literary education was greatly emphasized, and what little of scientific education was given was theoretical, so that we had Bachelors of Science who had received their degrees 'without having touched a test tube'! Such backward state of scientific education deterred western scientists, who had attained eminence in their own country, from emigrating to this country. Inadequate opportunities and equipment for research could not very well be a sufficient source of attraction to sacrifice one's career. The process of sending young Indians abroad to receive training in science and technology was very slow. The foreign Goverment gave no encouragement, and the results can be compared with those achieved by Japan that emerged as a Great Power within thirty years of her adoption of industrial economy.

Linked with these factors militating against the growth of science and technology in India was the social set-up. A rapid rise in population reacted unfavourably on the standards of living. Struggle for existence became very keen, and crushed out all

desire for the amenities of modern life. In India, man and animal have been engaged in competition; their respective weight of numbers has forced them into hostile camps, and they have both offered resistance to science. Lack of adequate means of transportation and communication has kept India's scattered village communities in physical and intellectual isolation; social contacts among the masses have been consequently limited. Ignorance and superstition still hold sway and keep the contributions of science at bay. Indeed, even the educated among us have not become conscious of the transformation science can make in our lives and in elevating the level of the masses from the brutish to the human. Fortunately, the situation is changing. The two wars have served to make India science-conscious. Science, scientific research and industry, have received a great fillip, and India's face is now turned in the direction of an increasing use of science and machine in service of her teeming millions.

CULTURAL LAG

But be the status of science in India what it may, it has initiated an era of transition, with zones of danger and points of tension. All social institutions do not change at an equal rate, so that a social order can become at any time a museum of cultural lags, of disharmonies. It is as though the various parts of a machine functioned at unsynchronized speeds. Thus

in India, her national culture and the culture of machine and science have come face to face and are crying for synthesis. Before we proceed further, it will be profitable to discover these points of conflict so that we may be the better equipped to suggest techniques by means of which India will be able to rebuild her national life.

ECONOMIC BACKWARDNESS

India's economic institutions are under the greatest strain. The old self-sufficiency of the village is gone, and it is now linked up with great trade centres of the world. The old system of barter has given place to money economy. Urbanization is moving forward very rapidly at the cost of the village. Our cities are now replicas of the cities of the West, centralizing in themselves industrial, financial and educational function. The war has given a great fillip to industry, and India has many mausoleums of coal, smoke, iron, dirt, overcrowding and squalor, of coolie-lines and human warehouses. The voluntary, co-operative communism, in which all the groups in the village worked together for the good of all, has disappeared, and India is now broken up into two camps, capital and labour.

POLITICS OF STRIFE

The political scene of India is one vast danger zone. India is being initiated into democracy, a creation of the mechanized *milieu,* with all its appaling futi-

lities. We have developed party machines, ballot boxes, sale and purchase of votes and mob psychology. The modern technique of propaganda is converting many a careerist into a 'leader' overnight, and he is a brother-in-profession of the political bosses of the West. The Indian politician is no longer a stranger to the art of lobbying and jobbery. The provincial and central legislatures were scenes of high-pressure groups when they functioned. India has provincial jealousies that resemble the national hatreds of European nations. The best among us are victims of this parochialism. The ghost of balkanization has run amock in the country. The spirit of provincialism demands a price, and that is sacrifice of talent; a sordid nepotism has overtaken us. The public service Commissions of various provinces advertise for applications from all over the country, but they don't fail to make it clear that only those belonging to the respective provinces need apply! The philosophy of rights, aggressive and assertive, has come to stay with us, and we are seeking to immortalize these legal fictions in our Constitution, while the totalitarian West is hammering them out of existence, with all due apologies to H.G. Wells, for his optimistic schemes of Human Rights. Public administration throughout the country is appalingly primitive both in structure and technical efficiency. The significance of the impact of technology on public administration and need for specialists is not generally realized by the Government and the public. The omniscient Indian Civil Servant can become an

Inspector-General of Police, a Registrar of Co-operative Societies, Director of Posts and Telegraphs, Collector of Customs, Chairman of a Port Trust, a high judicial authority, Director-General of Census, Director of Public Information, Dewan of a State. There is nothing under the sun he cannot do. Our men are fighting on frontiers, flung far apart on the face of the globe, but we have no world vision. Men in public life have absolutely no knowledge of world affairs, with a few exceptions. There are no institutions imparting knowledge in this important field. We have not appreciated the sociological significance of our *panchayat* ; it is in ruins everywhere.

EDUCATION A RACKET

Our educational system is a cluster of creaking joints, ready to fall apart. Most of the universities are situated in large cities, where environments are none too conducive to quiet research, contemplative thought and development of consistent character. Their administrative machinery is top-heavy, slow to move. Strikes by students, sabotage of examination papers, frightful percentages of failures in examinations, costing the country some crores of rupees and hundreds of thousands of years of life, anxiety of the teachers to write annotations to textbooks, attend meetings of the Senates and other bodies, racketeering in textbooks: all these are pieces of one picture and fit together. They are neither in

conformity with the idealism of education that India has known, nor in line with the requirements of the dynamic world in which we live. The ideology of struggle for existence and survival of the fittest permeates our educational philosophy. There has been no relationship between life and education; it has required two wars to awaken us to the urgent necessity of preparing our younger generation for some vocation in life, and not merely fill their heads with words and discontent. Our secondary and primary education is still primitive and wasteful. It is said that there is a wastage of seventy to eighty per cent in money, time and energy spent on primary and secondary education throughout the country. And yet we go into comical ecstasies about educating the adults and introducing compulsory education! We waste time in devising schemes and debating about them.

The number of subjects in our universities has certainly increased, but there is no co-ordination among them. Want of idealism still clings to our education. Our students don't get a complete picture of the world they live in. Bifurcation of arts and sciences leads to over-specialization. Knowledge of social technology and nation-building is unknown. Social sciences are offered in a truncated, abstract manner. Our younger generation is not being equipped to meet the intellectual, social and spiritual demands of the new age.

FOOD NOT ENOUGH FOR THE POPULATION

Our agriculture is still primitive and unorganized

while it has to compete with mechanized agriculture in the world markets. Notwithstanding the addition of new land to the plough as a result of the new irrigation schemes, arable land under cultivation is actually decreasing and has reached the point of exhaustion. Erosion of soil goes on unchecked. While famine stalks the land, population is increasing and threatens to double its present size by the time we turn round the present century. There is thus a terrible maladjustment of food and population. The average weight, height, and longevity of the people are going down. The signs of the degeneracy of the race are plainly visible.

CRIME

Crime of all kinds is on the increase. Train and mail robberies, kidnapping, rape, traffic in women and children have become quite common. Hatchets and daggers have given place to guns and pistols and bombs, as stealthy thefts at night are now given up in favour of armed robberies and hold-ups in broad daylight.

A NEUROTIC NATION

Our forms and techniques of entertainment are changing rapidly, and this is a zone of an explosive kind. A nation is what its arts are; the mode of emotional release determines its morals. The *Rasa Lila,* one of the most powerful mechanisms of diffusion of

our cultural heritage, is being given up in favour of the movie, made for a different type of audience. Even the pictures we produce lean towards alien canons of ethics and esthetics. This vicarious mode of enjoyment still leaves emotional energy unsublimated, reacting very unfavourably on the nervous system of the audience. We know more of cinema stars and their *affaires de cœur* than of the sufferings of Sita and Savitri. We have, in our homes, pictures of the former, not of the latter. Talkies multiply rapidly in large cities, and travelling picture-shows are invading the rural areas also. The music that we generally hear is not of the chaste, classical type, enshrining a sentiment of devotion or spiritual aspiration, but a doleful little ditty of the love-lorn, sung on the screen and broadcasted on the radio.

RELIGIOUS FANATICISM

Under such circumstances, religion has come to take a subordinate position in our lives and plays no very significant role in it. No longer do the mystical experience and the spiritual adventure inspire us and give us inner calm and ecstasy; instead, music before mosque, killing of a cow, or conversion of one insignificant individual, throws us into frenzied convulsions. There is no unity even among the protagonists of the same faith or creed. India's geographical, racial and spiritual unity, implemented by railway, telephone, telegraph, radio, aeroplane and newspaper, is

confronted with such movements as Pakistan, Dravidistan, Sikhistan, Achhutstan. Science should unite us, but our minds divide us. We are subverting the processes of history.

THE CHALLENGE

These numerous points of conflict, of cultural lags, put a great strain on our country, and she is threatened with the danger of forgetting her link with her national *samskaras* (genius) of being unprepared to meet the challenge of the future. There goes on unchecked a rapid disintegration of our culture which was built with nature's aid, and with contributions of various races and communities which have made India their home and given a firm foundation of the fellowship of many faiths.

This being the situation, India must bestir herself, be prompt in devising some ways and means of meeting the challenge, of speeding up the tempo of some of her institutions and reducing the speed of others; if need be, of bringing about a dynamic equilibrium, so that all the aspects of her life shall move in perfect accord. But we should first be clear of the kind of India we are aiming at. The goal gives meaning and direction to all effort; a vision of the ideal releases strength for action. Let us first form a clear picture of the India we want to bring into being.

SOCIAL OBJECTIVES

1. I submit that India should aim at reconstruc-

tion of every phase of her life, with the help of machine and science. With the accession of new energy, she should rebuild every home and supply it with every modern convenience; consolidate her scattered huts and hamlets into sizable towns, which should be built on principles of modern town-planing, with wide streets, paved roads, electric lights, modern sanitation, schools, libraries, opportunities for creative use of leisure. India's children should be assured, before they are born, the right to live and grow well; and this involves limitation and reduction of her numbers and a balanced land: man ratio. India's agriculture should be mechanized, modernized. Science should give us an insight into the occult processes of ecological balance, harmony, so that we shall treat nature reverently and not consider her gifts as mere commercial commodities. India's cities should be decentralized, so that they shall not be the sore spots of a sick civilization, giving harbourage to all crime, human misery and degradation. We should combine culture, agriculture and industry. India's workers should be healthy, strong, contented human beings, not mere economic hands. India should control insensate production, maldistribution and ultimate destruction of consumable commodities, manipulation of prices, lust for profits. Exploitation of nature and of man should not be allowed to disfigure India's economic institutions. These can be reoriented to conservation of her cultural values and the requirements of human well-being.

2. India's social and political structure should be so planned as to eliminate all the baffling problems that have led to chaos and have pulled down civilization. Marriage should be saved from the forces of disintegration attendant upon urbanization and industrialization, with all its bizarre experiments, abortions and frightful infant mortality. India must preserve marriage as a sacred institution for a joint spiritual adventure. When her men and women are happy and integrated individuals, and not denizens of the sub-human realm, there need be no large incidence of crime; and maladjustment should be remedied with the assistance of scientific criminology. The present legalized barbarism of revengeful punishment of the so-called criminal should give place to active assistance for his reabsorption in society.

3. It is only when India's educational institutions have become modern *ashramas*, in towns apart, with the light of knowledge coming from both the East and the West, with teachers who are real *brahmans* and *sanyasis* and not job-hunters and time-servers, and the students—who are the future patriots and servers of the Motherland—genuine candidates for wisdom, that India's spiritual heritage stands a chance of survival from the cultural assault of the West. The life of both the teacher and the student should be studious, self-controlled and dedicated to training in service in one department of the nation's life. The young India should not lose its link with the past and it should be trained to grow in

reverence for and homage to the great seers and sages, saints and scientists, whose sublime idealism and achievements are our proud heritage. A thorough grounding in social sciences, from high school upwards, should induct the younger generation in the ideals of social solidarity, while vocational training should eliminate the danger of misfits in life. India's institutions should be Temples of Learning and of Labour.

4. When freedom comes, we should recast India's political structure. A strong, central Government, capable of dealing scientifically with the problems of reorganization of areas, authority and mechanisms; of recruiting the necessary personnel on the basis of specialized efficiency and leadership; of adapting techniques of social sciences to public administration; of eliminating the problems of corruption, provincialism and nepotism; of determining and expanding the scope of govermental activity in the fields of social control and moral well-being; of correlating governmental expenditure with national income; of determining the position of the country in relation to other countries and sending representatives well trained in their tasks; of developing equality and freedom among the masses—such is my dream. Elimination of party strife; scientific, managerial municipal administration in place of the present communal scramble for mayorial office; and a complete fusion of interests of various communities and specialized groups, would complete the picture. It is India's mission to devise institutions that shall ensure realization of

ideals of liberty, equality and fraternity, to introduce systems of election that shall help to enlist the services of the most qualified but the least willing to engage in the political arena, her philosopher-statesmen. India's new *kshatriyas* should be masters of science and machine, able to guard India's honour, defend her soil from foreign aggression and internal discord. A mistress of her household, India should once more become the Mother of Nations, friend of all, foe of none.

5. India's religious and cultural life should breathe forth the fragrance of holiness. India should reassert the unity of all life, without distinction of race, caste, creed, colour and sex, since unity is the heart of her message. She must prepare to reveal once more to herself and to the world the unity of religion, philosophy and science that permeates every aspect of her life and thought. Science is already aiding to fulfil India's age-old mission of realization of unity amidst diversity. India's most imperative task, as I see it, is the presentation of a new incarnation of the wisdom of the Eternal, which embraces the mineral, the vegetable, the animal, the human and the superhuman, that unites the physical with the transcendental, the known with the unknown, the lower with the higher, the smaller with the larger. The world is famishing for want of this Wisdom. Oneness, not a mere fellowship of faiths which is a form of armed neutrality, is India's supreme task.

This, I submit, is the picture of India that should

inspire us and give a meaning to our lives. It is my firm faith that by devising appropriate means, this picture can become a reality. It is to the consideration of the means that we shall now turn our attention.

THE MEANS

It is rather presumptuous on my part to attempt this task, particularly when there exists the National Planning Committee, appointed by the Indian National Congress and many departmental committees appointed by the Government of India. I do not seek to anticipate their findings; the task of preparing a programme of national reconstruction does not fall within the purview of these lectures, and I shall content myself with submitting what I conceive to be the irreducible minimum for the achievement of our purpose. In the attainment of our goal, we shall have to adopt the following means:

1. In her economic life, India will have to undertake consolidation of her natural and human resources, regional planning, electrification of the nation, modernization of her newly-built rural areas; mechanized, co-operative agriculture; large-scale but decentralized industrialization for cultural and strategical purposes; decentralization of her megalopolitan cities; nationalization of all her natural resources, land and industries; abolition of all monopolies, Indian and foreign; a new type of money, based on industrial economics, divested of all motive of profit; judicious

control of population, especially among the lower strata of society through education, higher standrard of living and wide-spread instruction in spacing of children.

This economic reconstruction can be undertaken by a government of the people, and when India does have it, I believe the federal form will suit her particular genius and requirements better than any other. Revival of the *panchayats*, indirect franchise, joint electorates, Schools of Foreign Affairs, Diplomacy and Public Administration, and modernization of her land, air and naval forces will be found to be utterly indispensable for the achievement of political maturity.

3. But all this requires preparation of the nation through education, and India should have a *national* system of education. By national I mean that type of education that helps India to be true to her destiny through synthesis of all elements of conflict operating within her and attacking her from without. In this task, machine and science will be of infinite value to India. India should press their contributions in every branch of human knowledge and group life, putting equal emphasis on scientific and humanistic studies and on the essentials of Indian culture. This is bound to involve the liquidation of the present high-pressure propaganda conducted through the centralized broadcasting under government control, and its decentralization as a provincial subject, dedicated to the education of the nation and creation of enlightened public opinion. Our textbooks need to be entirely rewritten; our

journalism is still primitive, slipshod, easily amenable to control. All mechanisms of education, formal and informal, need to be vitalized, nationalized.

But in vain shall be all this reconstruction if India should lose her soul, if her spiritual and cultural values should be lost sight of in the fury of reconstruction of her material form. The cultural life of the masses so appalingly poor, needs to be refreshed, reinvigorated, and this can only be accomplished through the quickening of the spiritual impulses of the common man. Adherence to formalistic aspects of religion has held India in thrall of ignorance and superstition. India's youth will need to be trained in getting spiritual experience first-hand, and I can conceive of no better instruments for this task than inter-denominational *ashramas*, where experimentation with Eternal Verities will be a collective adventure.

It would be a very pleasant task to go at length into the sociological implications of these various steps or objectives, but it is not possible to do so within the course of a lecture. I must content myself with only pointing the way, leaving it to others to pursue the subject further, both as a matter of intellectual interest and as national service. But before we leave the subject here, there are a few aspects of it to which I want to draw your pointed attention.

1. Their Interdependence

Firstly, there is an organic ralationship or interdependence between these various social objectives

and means. Their value lies in interrelating what seem on the surface as disjointed factors or elements in the social life of India, to see the situation as a whole rather than as a cluster of parts. All national planning must proceed on the fundamental principle of subordinating parts to the whole, of co-ordinating specialized interests and atomic elements of social reality and dealing with forces and interests in association, with people, places, environments, work, political, economic and social institutions, culture, art, industry, religion, etc. as integrated wholes, of co-ordinating the entire social structure of the nation as a joint activity. Thus, all these objectives stand together and must be undertaken simultaneously. This demands the art of 'simultaneous thinking' if I may use the well-known phrase of Patrick Geddes, a rather strange and difficult task in a country reared on an individualistic ideology for the last two hundred years.

2. Their Inevitability

Secondly, these goals are inevitable, since the time-spirit points in their direction. Any balking of their fulfilment must result sooner or later in an explosion.

3. Conformity with Indian Ethos

Thirdly, they are in conformity with our national experience and ethos and lend themselves easily to adaptation, for, as we have seen already, India has made great contributions to the exact sciences from

time immemorial and known numerous periods of transition and of social and cultural change.

4. *All-Round Reconstruction*

Finally, these objectives aim at shifting the emphasis from one isolated panacea to an all-round reconstruction of India's national life. In this task, India must fight her battles on many fronts. Progress is a multi-sided movement, not a linear achievement. It will be only after we have succeeded in putting some of these objectives into operation and gained some initial results that a new India will come into being.

EDUCATION

In order to illustrate my thesis, I shall take one segment of our national life, Education, and show how science and machine can be utilized in its service, in building it up to serve the needs of the country in the present age. Now, education is intended to educe, to bring out the inherent capacities of the child—physical, emotional, mental, moral and spiritual—so that it shall grow to the fullest stature and be a well-integrated individual. From the standpoint of the group, education is an agency for transmission of the cultural heritage of that group to the safe-keeping of its younger generation. Hence our educational reconstruction will have to reconcile the claims of the individual and the nation through the media of science and machine. How shall we proceed?

1. University Towns

Our first task will be to build the institutions of higher learning in small towns, built specially to serve the needs of these institution. It is obvious that universities, located in urban areas, must draw our young men and women into a life of conflict. The purpose of the ancient *ashrama* ideal of India was to isolate the teacher and the student from the distractions, strains and stresses that are inevitable in a life lived among the crowds. The modern megalopolitan cities deflect both the teacher and the student from their respective duties, so that education becomes no longer concerned with service of the nation or conservation of social values, but a problem in pathology.

2. Education and National Problems

In educational institutions, our efforts will be concentrated on making use of those mechanisms that science places at our disposal, so that we may be able to eliminate conflict from every phase of social life. One of the social objectives of education may be the promotion of social and communal harmony. Very well, let us go about it scientifically, and not be content with passing resolutions on platforms. Whims and fancies of politicians, and political pacts do not alter human passions and prejudices which form the raw material of history.

Movie–In our task of bringing about national unity, we shall find the movie of inestimable value. With its assistance, we can dramatize India's national

evolution and make it visible to the eye. It will undoubtedly be a colossal undertaking to reconstruct India's history from ancient times to today, with the slow but steady march of her life. A pictorial representation of the pageantry of Indian civilization, of its manifold achievements and set-backs, of its power and purpose, will appeal to young and old, to illiterate and educated, to peasant and prince. It will give to the younger generation a vision of India's grandeur and uniqueness, a synoptic survey of her onward march through the ages, a glimpse of the majestic purpose projected by her Maker. Such a vision made to live once more before our eyes would be a source of great spiritual enlightenment, a veritable feast of beauty. One such movie, thrown on the screen in our villages, cities, schools, colleges and universities, will be equal to thousands of books and learned papers, to thousands of lectures, by politicians and propagandists. Ours is an 'eye-minded' age, if a mixed metaphor may be permitted.

The movie could also be utilized for showing the latest advancements in agriculture, industry, town-planning, sanitation and various other nation-building departments. Instead of allowing our masses to indulge in the ceaseless visual debauch of witnessing shows made in alien moulds, we can make use of this very helpful scientific device in building up a new and intelligent India.

Radio–The movie must synchronize with the radio. The radio is a powerful agent of education in modern times, and it should be of equal assistance in the stupendous task of disseminating Indian ideals and general useful knowledge to the younger generation in school and to the illiterate millions. One receiving set in each village would do the work of a dozen teachers or experts. It passes my comprehension why we cannot educate the entire nation with radio and movie functioning simultaneously in the class-room and the village temple. Sargent's grandiose calculations of thirty and forty years can be squeezed into five, if we go about the problem rightly. One thousand stations in the United States broadcast class-room programmes to which hundreds of thousands of classes are keyed up, with the movie functioning at the same time. This synchronization will, as one can easily see, minimize very considerably the problem of preparing teachers as well as the time and cost elements. A radio set will be a willing, inexpensive, effective instrument of service. One set can substitute many teachers. It can revive the corporate life of the village, give a national and world outlook to our masses and make them intelligent citizens of our country. Communal conflicts and social isolations, now beginning to penetrate the villages, will be arrested in their progress. The present centralized control of broadcasting in our country makes it an adjunct of the British Broadcasting Corporation and an agency of propaganda, not education.

3. Social Sciences

Our next step will be to deal with the student as a whole. Social harmony depends upon the integration attained by the individual. Therefore, in addition to training in some scientific and vocational subjects, we shall emphasize humanistic studies. A broad, general education is a dire need of the age. In every advanced country, it is being increasingly realized that the present debacle in civilization is not a little due to neglect of social sciences, which are so vitally significant for the development of a consistant, integrated personality and for preservation of group values. India is fortunately still alive to the value of her cultural heritage, and instruction in its essentials must form a major plank in her educational programmes. Study of social sciences is indispensable for preparation for the new age. The nineteenth century was devoted to the development of natural sciences; the twentieth belongs to social sciences. We shall, therefore, make compulsory: (1) *Gymnastics,* with elements of *Biology,* so that the student will have a healthy body and mind and learn how to draw his energies upwards into creative channels on a higher level; (2) *Psychology* will introduce him to laws of working of the human mind in individual and mass, its limitations and possibilities of expansion; (3) *Anthropology* will give him a scientific and rational understanding of the racial composition of his people, a tolerance for diversity of life and thought, but all informed by one

common humanity, so that the present and the future history of India shall not be disfigured by communal hatreds such as have made a shambles of the western world today; (4) Through *History* he will catch a glimpse of the splendid destiny being worked out by our Motherland and thus learn to love her sacred soil; (5) *Sociology, Politics,* and *Economics* will give him an insight into the working of society and its various problems that will confront him when he takes up his membership of the group; (6) Practical training in one *Art* will give him emotional purity, stability and expansion; while (7) *Literature* will lead him to an appreciation of the feelings that have moved the hearts of mankind, which it has sought to record in beautiful prose and rhythmical poetry; (8) Finally, *Philosophy* will initiate him into the problem of the ultimates, of values, of the inner yearning of man for a life deeper than this, of those grand and eternal passions that have impelled man to venture forth into the realm of the Eternal and the Unknown where Truth abides. It is through this general, humanized education, made compulsory and given in a somewhat elementary form, that we shall be able to have intelligent students, citizens and scientists who will be a credit to their country. [1]

1. The author feels gratified to recall that he put up a plea for this all-round education in his small booklet, 'University of Ceylon', as early as 1941, and repeated it in his address to the Indian Science Congress in January, 1942. In the same year, the Division of Social and International Relations of Science of the British Association for the Advancement of Science appointed a Committee to report on Post-War University Education. For recommendations contained in the interim report, see Appendix I. According to a report in the *Christian Science Monitor, Weekly Magazine,* dated January 15, 1944, President Robert M. Hutchins, of the University of Chicago, had already started this experiment for undergraduate students in the University.

It is needless to say that our approach to all these subjects must be India. Exact sciences are international and know no frontiers; but the social sciences and arts, as India has developed them, will alone serve her. Indeed, the Western social sciences have come up against certain deadlocks for which they are seeking keys that India alone can provide. India can make a unique contribution by demonstrating the application of her age-old experience and wisdom to her national life today and by being true to herself. The rapid advancement of industrialization is sending resounding blows through the whole social fabric of India, and it is the primary duty of every educational institution to see to it that India does not enter upon that type of social chaos in which the world is engulfed today.[1]

This kind of renewal of India's life, based on the contributions of science and machine, is not only necessary for our education, but for every segment of our national life, and I hope I shall be forgiven

1. Indian education is in dire need of many other reforms to bring it into line with the needs of the age. Decentralization of her universities, so that every college will be free to conduct its own examinations and grant its own degrees; abolition of the so-called charters issued by the Central Government to fetter all experimentation in education; decentralization of the matriculation examination and making it a concern of the high schools, so that the clerical establishment of the Director of Public Instruction will no longer dictate policies; abolition of the so-called Provincial and Imperial cadres of services through which the Central and the Provincial Governments keep control over education to some extent; appointment of Vice-Chancellors and Directors of Public Instruction on basis of specialized knowledge of the problems of education confronting a backward country like India, and, not merely administrative basis of efficiency and in carrying on party-politics and intrigues within the walls of institutions of learning — these are some of the reforms urgently needed if Indian education is to make any headway n the near future. The situation is very dark and depressing at present.

for sharing a personal fear about the possibilities of such co-ordination. The Government of India has constituted a Council of Scientific and Industrial Research, but the Council is not equipped to pay any attention to the economic consequences of its research. Economic Reconstruction Bureaus have also been started, but they receive no aid from the scientists who could enlighten them about the consequences of their researches. A special department for co-ordinating and centralizing various departmental plans has also been started by the Government of India, but it is problematic if the clerical machinery of the Central Government is competent to appreciate the fact that departmental co-ordination is not synonymous with synchronization of scientific research and social technology.[1] An alert and up-to-date Department of Plan-

1. The member in charge of this new department is himself a retired civil servant and a former director of the well-known firm of Tatas. It remains to be seen whether he will be able to get over his isolationistic type of thinking and administration in which he has been brought up during his official career.

India has suffered from this baneful heritage handed down to her by her present rulers. The particularistic type of mentality has always reflected itself in the British home and imperial policies. For instance, the Royal Industrial Commission for India was not authorized to consider the fiscal policy of the Government; the Royal Fiscal Commission was not to consider the question of revenues; the Royal Agricultural Commission was not permitted to pay attention to the problem of population, quantitative and qualitative, and the standard of living. Backwardness in the teaching of social sciences which could impart an integrative outlook to the people and the rulers of Britain may be put down as one of the chief causes of the catastrophe that has overtaken Britain. For a fuller account of this serious lacuna of British education, see Appendix I.

ning, aided by those who have mastered the art and science of this subject, can save the country enormous sums of money and precious time by a long-range view of things, and what is more, that chaos that has made a shambles of the world.

This, friends, brings our subject to a close and we must now part. But it is my earnest hope that this series has succeeded in winning your support to the thesis that it is by pressing science and machine into service and in conformity with her age-old ethos that India will be able to save her soul and that of the world. India's method of adjustment to the new world-forces has world-wide significance, for, we must never forget that the contrast is not between the East and the West, but between India and the rest of the world. On India devolves the duty and responsibility of being a beacon light to other countries and saving mankind from the impending doom of physical and spiritual suicide. India must live, for, 'If India lives, who dies? If India dies, who lives?'

Go, speed the stars of Thought
On to their shining goals ;–
The sower scatters broad his seed
The wheat thou strew'st be souls.

—R. W. Emerson

APPENDIX I

SOCIAL SCIENCES IN THE BRITISH UNIVERSITIES

The beginnings of a synthetic, integrated approach to the problems of life in Europe lie in the latter part of the eighteenth and early part of the nineteenth centuries. This was a period of great social ferment in Europe. The dark clouds of the French Revolution still cast their lengthening shadows on the European mind. But the contributions of various separate, unconnected social disciplines, vague and inchoate so far, were beginning to be synthesized into a co-ordinated system of thought and focussed on the problem of living.

The first person to have caught a glimpse of this integrated approach to the problems of life in England was John Stuart Mill. He was primarily an economist. From economics, he was led to Psychology and Ethology, the Science of Human Character. According to Bain, Mill's failure with Ethology 'interfered with the larger project, which I have no doubt he entertained, of executing a work on Sociology as a whole.' [1]

Then came Adam Smith, who lectured on Ethics, Jurisprudence, Political Economy and Natural Theology, thus taking the then-known realm of knowledge as his field of investigation. In his *Theory of Moral Sentiments* (1759), he promised, according to Ingram, to give 'an anticipation, wonderful for his period, of general Sociology both statistical and dynamical — an anticipation which becomes still more remarkable when we learn from his literary executors that he had formed the plan of a connected history of liberal sciences and elegant arts which must have added

1. **Bain A.**, *John Stuart Mill*, 1882, p. 78

to the branches of social study already enumerated a view of the intellectual progress of the human society.'[1] It was only for purposes of study that Smith separated the economic aspect from the rest of social life.

On the continent, Herder's *Philosophy of the History of Human Society* (1784), Condoreet's *Progress of the Human Mind* (1796), and St. Simon's *Introduction to the Scientific Work of the Nineteenth Century* (1807) gained considerable popularity in Europe, while Owen introduced in England a new ideology through his *The New World* (1836). In was during this period of intellectual and social upheaval that 'Sociology' was ushered into being by Auguste Comte through his *Principle of Positive Philosophy*, published in 1851-4. This was followed by Karl Marx's revolutionary work, *Das Kapital*, in 1857.

But Great Britain remained unaffected by these tremendous upheavals in human thought. She was just stepping into her glorious period of economic supremacy, imperialistic expansion and world domination. Industrial wheels were whirling fast, British ships sailed the seas. The Indian Empire fell into Britain's lap, the Sepoy Revolt was easily quelled in 1857. England rejoiced in the strength of her far-flung empire. The wealth of the country increased by leaps and bounds; investments abroad soared high. With the birth of capitalism was born the concept of the nation in European countries. Thus, the Industrial Revolution gave birth to capitalism, nationalism, militarism and imperialism, and Fate selected Britain to be its favourite,

The prevailing mood of these times was one of expansion, growth, strength; and it became further augmented by Charles Darwin's theories of natural selection, struggle for existence and survival of the fittest (1869). Galton added his contribution through his eugenical doc-

1. Ingram, J. K., *A History of Political Economy*, 1914, p. 89

trines, according to which the strong were nature's elect (1869). Thus, the science of biology became a handmaid of the economic and the political doctrines prevailing at the time. Ruskin fulminated in the British universities against the pagan art of India and stood for the supremacy of the European genius (1859). The intellectual climate of England was permeated by a sense of power. The poor had only the right to argue for rights. The Reform Bills of 1832 and 1867 yielded little, when compared with the cataclysmic changes that rocked the European continent. To be sure, there were numerous problems, consequent upon the emergence of technology, clamouring for solution. The slums and squalor of the rapidly-rising cities, the disruption of agriculture, the constant shifting of landless population to the urban areas, the low standard of living and low wages, accompanied by high mortality in the cities, and numerous other problems there were, but they were left to philanthropy and public charity. Indeed, Herbert Spencer advanced the theory of laissez-faire, objecting to any interference of the State in the scheme of social welfare for the poor. He became the St. Paul of Charles Darwin.

For one hundred and fifty years, we don't hear of Sociology in British Universities, excepting for the lonely and infructuous voice of Herbert Spencer. He was a keen protagonist of Sociology, but not being a University man, the effectiveness of his contributions to the education of his day was considerably marred. But it is interesting to know that he urged for the introduction of the subject in 1880 in the University of Liverpool. He writes in his Autobiography : 'I had an interview with Lord Derby for purposes of enlisting his sympathies in favour of Professorship of Sociology, which I want to get established at Liverpool......It seems, however, he has settled that it is to have a Chair of Natural History, so that my hope that

he would, at my instigation, establish a chair of Sociology is balked.'

Thus, not harassed by any major social crisis demanding attention, the British Universities devoted themselves to the training of captains of industry, colonial officials, financiers and empire builders.[1] They remained indifferent, if not hostile, to the development of social sciences. That is the explanation for the 'late academic development and subordinate position of the social sciences', of which Professor E. M. Burns complains but which he fails to discern. As late as 1894, a special Committee of the British Association for the Advancement of Science reported that except at Oxford and Cambridge, where also the study was very unsystematic, 'it would be difficult to imagine a more complete indifference to the scientific study of economics than that displayed at the present time.' To quote Professor Burns: 'Yet economics was then accorded greater academic recognition than any other social sciences. Anthropology was not taught in the universities until 1884, and sociology not until 1904. Political Science had been taught with varying effectiveness in connexion with philosophy, but no chairs were created until the twentieth century. More, history was studied very little at the universities until after 1850, and not until the end of the century was much attention paid to its social or economic aspects. Law untill recently has been taught entirely as a professional or technical subject; in 1924 the Downing Professor at Cambridge claimed that in seven centuries of law teaching "the last fifteen years stand out in bold relief as a period of notable progress." Even today, except at London, the

1. For a very interesting account of the general British attitudes of insularity and self-centredness, see 'The British Commonwealth and the United States in the Post-War World—Pamphlet No. 10, issued by the National Peace Council, London.

social sciences occupy the smallest, least popular and least well-endowed position among all the subjects at the different universities, and they can scarcely be said to have penetrated the pre-university educational system.'[1]

But, with the birth of the twentieth century, social problems assumed a menacing shape, and attempts were made by some eminent men to introduce elements of liberal thought into the country. With Lord Bryce as the first President and Victor Branford as its Honorary Secretary, the Sociological Society of England was ushered into being in 1903. The first course in sociology was offered by the London School of Economics and Political Science in 1904; in 1908, the two lecturerships were changed into professorships. In 1912, the munificence of Sir Ratan Tata led to the establishment of a Chair of Social Sciences in his name, with Professor E. J. Urwick as the first occupant. Liverpool established a Department of Social Sciences with a professorship and three lecturers in 1923. St. Andrews and Aberdeen have had Sociology for short periods. The Sociological Society has been converted into the Institute of Sociology. The Institute organizes discussions, issues the 'Sociological Review' under the editorship of a Board, and invites papers from students of social sciences. The most important of social sciences, Sociology, still occupies the least significant place in British education; other social sciences have not fared any better. Compared with the gigantic strides made by them in the American and the continental institutions, they are still in a primitive stage in the British.

Even as late as 1920, prior to his departure for Harvard, William McDougal wrote: 'In America the public interest in psychology and sociology is much more wide-spread than

1. Burns, E. M., 'Social Sciences as Disciplines : Great Britain' *Encyclopaedia of Social Sciences*, 1930, p. 231

in these islands, a fact sufficiently attested by the existence of chairs in these subjects in all the leading universities, and the lack of such chairs in all but two or three leading universities in this country. By those Englishmen who believe that the study of these sciences is a matter of urgent national importance this state of affairs is deplored, and they desire and even hope that in this matter the example of America may soon be followed. Meanwhile I send this book across the water, in the hope that it may contribute its mite towards the working out of the great experiment in Social Science which the American people is making with an ardent faith in the power of the Group Mind to attain effective direction of its own development.'[1]

The consequences of this persistent neglect of social sciences in the British Universities could not but be disastrous. The various national and imperial problems were solved by piecemeal legislation ; there was no appreciation or understanding of the larger frame-work of which these problems were a part, and in the light of which their challenge could be met.[2] Reconstruction of life on a national scale and in terms of the changes introduced by the new technology was still unknown, the chief reason being that the whole education for the whole man and the whole nation had not found its way into British education. Some of the most eminent scholars left the country. William McDougal (Psychology), Malinowsky (Anthropology), Bertrand Russell and Whitehead (Mathematical Philosophy) migrated to Harvard; MacIver (Political Science) and E. J. Urwick (Sociology) joined Columbia and Toronto Universities respectively, Harold Laski is not a permanent fixture at London. Toynbee (History) has joined the British

1. McDougal, Wm., *The Group Mind*, Preface to the American Edition, 1920.

2. See London *Economist*, February 12, 1938.

Ambassador's office in Washington D. C. to conduct propaganda on scientific lines! There are no social scientists of eminence teaching in British Universities.

This neglect of social sciences and of the sociological point of view is one of the primary causes of the catastrophe that has overtaken Britain at present. The complacent, smug mentality, inherited by the British from the halcoyn days of the nineteenth century, has done them, their country and the empire incalculable harm and the cost of retrieving the lost ground is very heavy indeed.[1] The pre-war situation in the British Isles is described thus:

'Typically, such a student at present devotes his whole time to Science, pure and applied. He has usually little knowledge of world affairs, or of the government of his own country or locality. If he lives at home, as majority of the students do in most of the modern universities, his entire university life may, and often will, consist in attendance at science lectures and laboratories, with a break for lunch in the refectory. The rest of his "student" life is spent at home, where he may not find any stimulating discussion. Foreign scientists, scholars and students residing in the United Kingdom have been astonished that the future leaders of the country should know so little about workings of democracy or its achievements in social welfare.'[2]

But the spread of universal education, the revolutionary changes in social life brought on by recent advancements of science and machine, and the increasing impact of American education on the British, have given courage to the younger

1. The particularistic or individualistic type of mentality has always reflected itself in the British imperial policies.

2. See 'Post-War University Education', Interim report submitted by 28 leading scientists and educationists in the United Kingdom, to the Division of Social and International Relations of Science of the British Association for Advancement of Science, *The Advancement of Science*, Vol. II, No. 7, September 1942, p. 258.

social scientists of Britain, and they are clamouring for an integrated approach to the problems of social life, as well as for co-ordination of the various sciences in the Universities.

The British Association for the Advancement of Science has taken a leading interest in the matter. It started a few years ago a special Division of Social and International Relations of Science under the presidentship of Sir Richard Gregory, an ex-editor of *Nature*. This Division appointed in 1942 a Committee of Experts to report on 'Post-War University Education', and their recommendations, embodied in the interim report, make very interesting reading. They write: 'In English universities the first two years' course might cover:

A. Physical science, including astronomy, with emphasis on the order in which the several facts have become known. Many students would not need to continue the study of this subject beyond their first course.

B. Biological and geological science: the elements of animal and plant evolution, development and functions.

C. History of science and learning, with reference to political and social history.

D. The social science, including sociology, anthropology, and psychology, with the elements of moral and political philsophy.'[1]

Attempts are also being made to start a Social Science Research Council, enjoying the same status and independence as the Social Sciences Research Council of the United States of America.[2]

Thus, with a Division of Social and International

1. *The Advancement of Science*, p. 258

2. *The Advancement of Science*, August, 1943, Report of the Committee on Scientific Research of Human Institutions.

Relations of Science functioning within the British Association for Advancement of Science, with university education reoriented towards emphasizing of social sciences, and with a Social Sciences Research Council, the social sciences in the British Isles should get a new deal, now long overdue. Without this reconstruction of her whole structure and content of education, Great Britain may seal her own doom and pass into the immediate history as a third-rate power.[1]

APPENDIX II

SOCIAL SCIENCES IN INDIA

POST-WAR EDUCATION

A great danger threatens education all over the world —the danger of intensification of emphasis on science and technology at the cost of liberal arts and the humanities. Votaries of the latter will put forth feeble infructuous attempts to secure support of an apathetic public and indifferent governments of their countries, but it will be the sciences and technological subjects that will carry the day, whether it be for purposes of reconstructing the shattered world or for preparing to meet the challenge of the crisis of the present-day type. The nations that have been frightened out of their wits by the colossal preparations of the Axis nations are not going to 'beat their swords into ploughshares' overnight. The war-psychosis is going to linger long with mankind, considering how dreadful has been the combat for the last few years. There is going to be no self-deception of the post-Versailles type. The

1. The reader will notice that the plan for an Indian Academy of Social Sciences took a definite shape in the early part of 1941, (see the next Appendix), while the committee on Scientific Research on Human Institutions was not formed till late in 1942 and it submitted its report in August, 1943, to the British Association for Advancement of Science.

following statement of Julian Huxley gives us a forecast of the shape of things to come, as far as the British Isles are concerned : 'When the war is over, the U. S. A. and the British Commonwealth can continue their co-operation for security. Instead of creating economic chaos by closing down armament factories wholesale, we can continue turning out stocks of the weapons necessary for modern warfare—planes, tanks, heavy guns, submarines and large warships. That will be our distinctive contribution to the security problem. That of Germany will be a compulsory contribution—the giving up of the right to manufacture arms at all. That of the small nations of Europe will be the sacrifice of their sovereign right to neutrality. They and we will join to form what may be called the security club, in which Britain and America, jointly, would play the same kind of role as regards the supply of arms that is played by Britain within the British Commonwealth.'[1]

Be the fate of this daring prophecy or wishful thinking what it may, one of its implications is bound to come true in quite a different direction. Education will be regimented to meet the challenge of the type of catastrophe that has overtaken mankind now. It needs no crystal-gazing or very high intelligence to read the signs of the times. Education will emphasize sciences, industry, and technology ; cultural studies will be threatened with extinction.

EDUCATION IN INDIA

The situation in India will be much worse. The educational machinery has been used so far by India's alien rulers to promote denationalization of the people. We have been made to study history, geography, and social, political and cultural institutions of our rulers; our education has

1 Huxley, Julian. *Democracy Marches*, 1941, p. 102

borne no relationship to *our* life and *our* needs. Education in a conquered country must always be used as an instrument of propaganda to break the spirit of nationality of the subject race and bolster up the superiortiy, spiritual and temporal, of the rulers.[1] Our Univesities have not fared any better.

Originally brought into being to produce quill-drivers for the administrative machinery of the foreign rulers, the Universities have changed but little since the time of their inception. They are utter strangers to the arts and sciences of nation-building. As Vincent Smith rightly remarks of them: 'The Indian Universities suffer from want of root. They are mere cuttings stuck down in an uncongenial soil and kept alive with difficulty by the constant watering of a paternal government. When an Indian student is bidden to study Philosophy, he should not be forced to try and accommodate his mind to the unfamiliar forms of European speculation, but should be encouraged to work on the lines laid down by the great thinkers of his own country, who may justly claim equality with Plato, Aristotle and Kant. The lectures and examinations in Philosophy for the student of an Indian University should be primarily in Indian Ethics and Metaphysics, the European systems being taught for the sake of contrast and illustration. So far as I know, the courses prescribed by the Indian Universities are not on these lines. It is useless to ask an Indian University to reform itself, because it does not possess the power. Some day, perhaps, the man in power will arise who is not hidebound by the University traditions of his youth, who will perceive that an Indian University deserving of the name

1. The educational policy of the Government of the United States of America in Philippine Islands was emphatically an exception to this rule.

must devote itself to the development of Indian thought and learning, and who will care enough for higher education to establish a real University in India.'[1]

These are not the words of an Indian political firebrand, but of an English historian of India who was not overflowing with love of our country and our people. The atmosphere of artificiality and unreality that surrounds our universities is due to the fact that they are unconscious instruments of the imperialistic design of denationalizing the people, and also because they do not pay attention to the vital problems of nation-building.[2]

The present war has revealed the hollowness of the whole Indian educational system and both the government and the people are in a hurry to cover the lags of a century in as short a time as possible. The Government of India has drawn up a scheme of educational development that will cost the country four hundred crore rupees and take forty years to fructify,[3] while the universities are going in heavily

1. Smith, A. Vincent, quoted by Anilbaran Roy, in *Sri Arobindo: Some Views on International Problems.*

2. There have been a few protests against the official system of education. The Bengal Council of National Education, the Indian National University, Adyar, Madras, the Vishwa Bharati, the Gujarat, the Kashi and Maharashtra Vidyapithas, the Tilak School of Politics, the educational activities of the Theosophical Society, the Ramkrishna Movement and that of the Arya Samaj have attempted, with varied success, to stem the tide of the cultural disintegration of India, but ignorance of techniques of social sciences have defeated their purpose and they too have become a part of the official educational machine.

3. The plan drafted by Mr Sargent, the Educational Adviser to the Government of India, suffers from two serious defects: it does not take into consideration the contributions of science and machine which would cut down his expenditure of time and money: secondly, Mr Sargent does not seem to have realized that his whole plan will be subjected to a great strain as time passes and India's population keeps expanding at its present rate.

for science, technology, aviation, military training and other subjects. The Universities of Bombay, Nagpur and Madras have received special endowments for starting technological and textile institutes; large laboratories are going up rapidly. The war has accelerated the tempo of industrialization and education is trying to keep pace with the times. The schemes of national planning will give added impetus to sciences and technology, since there will be an increasing demand for technically trained men.

ITS TWO-FOLD PROBLEM

Indian education will thus be confronted with a two-fold problem. First, it will need to place an increasing emphasis on scientific and technological subjects, not for the purpose Julian Huxley has in view for his country — to make it a policeman of the world and salesman of the murderous instruments of war — but to improve the lot of its millions and to make India a strong, self-sufficient country. Secondly, it will have to put forth a vigorous attempt to shake itself free of all the un-Indian elements that permeate every aspect of our life in a subtle and pervasive manner, undermining the very foundations of India's culture (so that we are witnessing with our own eyes the breaking up of her national integrity being planned in a cold-blooded manner by her 'leaders'). At the same time, the younger generation will have to be given a thorough training in social technology and nation-building, so that India will assimilate the best of the West, synthesize it with her cultural values, and become once more the spiritual leader of the world. Promotion of the first objects is the task of the scientist, while to aid in defining the issue of the cultural synthesis and in creating effective instruments for its realization falls within the province of the social scientist.

THE FIELD OF SOCIAL LIFE

Let us now pause for a moment and scan the horizon. To change the metaphor, let us outline the contents of the social and cultural life of the country, so as to be sure of the contents and scope of education with a view to predict and plan social and cultural changes in our country. If we are to understand fully our national ethos and get a firm grip of the realities of today and tomorrow, our first task will be to study the history, evolution and functioning of the two types of cultures, the Occidental and the Indian. Then must follow analyses of the underlying social processes that eventually incarnated into these two cultural patterns or configurations. We shall begin with the study of the relationship between the organic and the inorganic environments and their relationship to, and effects on man and his group life. Next should come the cultural history of the people, their ways of thinking and acting, their folkways and *mores*. We would then have to close in and concentrate our attention on man, his original nature, his biological endowments; on human nature acquired through the process of interaction between him and the group; on the development of social attitudes and ideas and on the processes of competition and conflict, accommodation with, and assimilation in, the social order; on the mechanisms of social control by means of which the group controls the the centrifugal tendencies of its members; on the collective behaviour of people, men in mass. The problem of population, both quantitative and qualitative, the standards of living, will be significant phases of study. The techniques of propaganda and the formation of public opinion would form other branches of study. Social mobility, horizontal and vertical, that is movement of people from one calling to another and along the sliding scale of

heirarchy, would give us a clue to the dynamics of the social order. The major social institutions, such as education, family, economics, industry, labour, politics, religion, arts and sciences, their evolution and adaptation to the changing times and the processes of their atrophy or fossilization, would give us an idea of the direction in which the social life of the people is moving. Then would come study of the two types of communities, the rural and the urban, and their effects on the trend of human civilization. An interesting phase of study would be that of social change, evolutionary and revolutionary, the anatomy of revolution so as to detect its oncoming, the emergence of social movements, the problems of social disorganization, the techniques of social repairs and social reconstruction. Finally, we would have to face the problem of values and answer the question whether there is such a process as planned social change, conscious social progress, or whether human life should drift along like a derelict on an uncharted sea.[1]

This pragmatic and synthetic study of life, past and present, is the chief function of the Science of Sociology, and it has not been attempted, to the best of my knowledge by any educational institution in India. The various departments of social studies in universities have never dared to face the interrogation, WHY ? Why is any subject studied at all ? What is the purpose which years of strenuous labour on the part of students and teachers lead to ? Shall we continue to grind out graduates in sciences to become clerks in government offices, give training in economics to produce railway ticket collectors, etc.? Our education must face this question, and it will hasten its socialization, emphasizing one definite aim in view, which must always remain as the resolving of cultural conflict in India

1. For the list of courses offered in this subject, see Preface.

and evolving a well-adjusted, progressive social order in an on moving, dynamic world.

SOCIOLOGY AN AMERICAN SCIENCE

It is the function of Sociology to fulfil these varied tasks, and Sociology is as old as man, since man has always been confronted with the problem of living in a group. Sociology envisages this pragmatic, all-inclusive approach to social life. Indian in origin, it is, as we know it today, an American science,[1] since America has been selected by Providence to be the seat of a new civilization and the nursery of a new race, where science has reached its apex in the service of man and where changes in every aspect of social life take place with lightning rapidity.[2] Unfortunately for India, our education has been based on the British patterns and our age-old inertia, combined with British conservatism has played havoc with our national being.

SOCIOLOGY IN INDIAN UNIVERSITIES

Sociology is still a stranger to Indian Education. But some concerted attempts have been made in recent years, beginning with 1939, to awaken our universities to the high purpose of this Science and to focus their attention on the vital urgency of offering it as an undergraduate subject. But it has taken an enormous amount of correspondence with them, distribution of books and reprints of articles

1. Hence the ostensible hostility of a British teacher in India to this Science.

2. Totally unprepared for war even as late as 1941, America was able to gear up her whole life to the winning of war, once she joined the hostilities. Within three years, she smashed Hitler's European Fortress, and drove him out of France. A youthful and plastic body and mind are fit vehicles of the powerful soul, whether of an individual or a nation.

published in scientific journals and pamphlets by the thousand, tours throughout the country, lectures before university groups, discussions with professors, appeals to leaders and educators for introduction of Sociology in the curricula, that some success has been achieved. Thanks to the Inter-University Board, composed of the Vice-Chancellors of the Universities, a resolution on the subject has been passed by the Board at its two consecutive annual meetings, 1942 and 1943, urging the universities to find a place for this subject. When the present writer conducted a survey of the situation in 1942 to find out what action was being taken, most of the Universities co-operated and replied to communications. The result made interesting reading :

The Universities of Agra, Allahabad, Delhi, Nagpur and Travancore had referred the matter to their respective academic bodies for report. The Andhra University had put the subject in the syllabus in 1923, revised it for introduction in 1944. But no provision had been made to teach the subject all these years. The University of Bombay started a School of Economics and Sociology in 1922, and Sociology has been offered for M. A. and Ph. D., but strangely enough without any preparation in the elements of the subject in undergraduate classes! The matter of introducing it as an optional for B. A. was raised by the Academic Council in 1940 and the matter was referred to a Committee. So far, no report has been received from the Committee. In Calcutta University, an institution that prides itself on being one of the premier Universities of the British Empire, there was provision for only one paper for the M. A. course in Economics. The University authorities had no intention of putting into operation the resolution of the Inter-University Board in regard to making provision for undergraduate teaching of the subject. Dacca had introduced the subject, but the instructor was a graduate in psychology, In the University

of Lucknow, Sociology was included in the curriculum of the Departments of Economics, and the elements of Sociology were offered at the undergraduate stages. There was also one compulsory paper in Sociology for M. A. students in the Department. The University of Mysore introduced the subject in 1923 and continued to offer it as a subsidiary for B. A. with three papers in the subject. The teacher of the subject had no training in Sociology. The Osmania University introduced Sociology in undergraduate classes in 1923 and now offers it for B. A. and M. A. The professor received training in the subject in Heidelburg University. In Patna, the subject was recommended for adoption by the Re-organization Committee a few years ago, The matter will be considered when the reorganization scheme is taken up as a whole, which will be after the war is over. The Annamalai and the Punjab Universities pleaded paucity of funds, Aligarh did not reply, while the Madras University discussed the subject at various meetings of the senate and other academic bodies, and decided to refer to a dictionary for definition of the subject!

The Inter-University Board repeated the resolution at its 1943 meeting and the Central Advisory Board of Education, Government of India, endorsed the resolution, and forwarded it to the Universities for action and report (January, 1944).

WORK TO BE DONE

This is not a bad beginning, though much remains to be done. There is still no appreciation of the issues at stake, no clear grasp of the contents of the subject, so that a miscellaneous assortment of instructors, with training in history, economics, psychology and anthropology, are content to leave the subject without uniformity of curriculum offered by the various institutions. Instructors with

appropriate training in the subject can be counted on the fingers of one hand. There is no organization to link them together and give an edge to their work. There is a general impression that Sociology is just another subject to be taught from a textbook in a class-room. But Sociology is much vaster and much more dynamic than that. The student lives in a social *milieu*, he is affected by his environments all the time. He meets with his frustration there and his search for solution of the problems of life gives birth to a desire to know the truth. He sees his country under a strain, the social and cultural institutions changing before his eyes. It is here that the science of Sociology takes birth. Sociology is not a mere mental discipline to sharpen our intellectual tools to inject more conflict and chaos into the social order, but a powerful instrument to aid in the piloting of the individual and the national life and in the tasks of national planning and reconstruction. If we want this subject to be taught in our schools, colleges and universities, then we must be prompt in defining its contents, outlining the syllabuses for Inter, B. A., M. A. and Ph. D. stages, drawing up bibliographies and preparing textbooks based on material drawn from the life and the thought of the people, providing practical training in the techniques of social research, fixing qualifications for teachers who are to teach the subject, urging its introduction forthwith in all the Universities, prodding the Departments of Public Instruction in the Provinces and the States to give an increasing social bias to education, and, finally, establishing contacts with bodies engaged in similar tasks in other parts of the world where great advances have been made in this respect. These tasks can only be shouldered by an organization, preferably of all-India character. A Sociological Society of India would be an appropriate body to deal with them. But such a Society must remain a dream

for a long time to come.

THE CENTRAL ADVISORY BOARD OF EDUCATION

But it is not that we have to present only a theoretical knowledge of sociological principles to our younger generation. That knowledge has to be applied to the problems of daily living and national Government. There is an urgent need for renovation of public administration in our country, since it is still 'antiquated, antidilluvian', to use the well-known words of the late Mr Montague, the Secretary of State for India. An attempt was therefore made as early as 1940 to approach the Member for Education of the Government of India and interest him in the practical significance of Sociology for purposes of administration. The Honourable Sir Girija Shankar Bajpai, the Member in charge, when convinced of the significance of the subject, resurrected from the archives of the Government Secretariat a memorandum sent out to India from Whitehall in 1937 in connexion with training and research in social service and public administration through an institute attached to the University of Delhi. He placed this memorandum before the Central Advisory Board of Education at the first meeting at which he presided, in May 1940. The Board appointed a Committee, presided over by Sir Maurice F. Gwyer, the Vice-Chancellor of the University of Delhi; that Committee submitted its report at the January 1941 meeting of the Board, recommending the establishment of an All-India Council of Social Services and an institute of research and practical training at the central government, the latter with an annual budget of Rs. 75,000 to 1,00,000.

At its meeting held in January 1942, the matter was brought up for further discussion. From the information supplied by the Educational Commissioner with the

Government of India (now the Adviser), it was learnt that 'The Board reviewed the reports of the Provincial Governments, Local Administrations, State Governments and Universities in India, with regard to the Social Service and Public Administration Committee's Report, and the further information supplied in respect of work undertaken by voluntary agencies of an all-India character in their areas. While hoping that their recommendations would be implemented, wherever possible, even in the present circumstances, the Board recognized that it might not be feasible in the immediate future to set up the proposed central body to be called All-India Council of Social Services, with an institute for research under its control. The Board suggested, however, that in each province and other large administrative areas, every effort should be made without delay to stimulate and co-ordinate the work of the various social service agencies, both voluntary and official, and to arrange for the training of social service workers of all grades. It was also decided that the Central Bureau should continue to collect from provincial governments and voluntary agencies of all-India character detailed information regarding : (1) existing agencies for social services in their areas, including universities; (2) the scope of their activities; (3) their relation to one another and the means adopted to co-ordinate their work and to submit it to the annual meetings of the Central Board.'

Thus has a plan for research and training in social services and public administration ended in bringing into being a departmental bureau for collection of information from the various provinces and agencies in the country. But Nemesis overtakes every one, individual or the group, that will play with the dictates of destiny. Within three years of awakening interest in this field through a sympathetic Member for Education, the Government of India has

started a Department of National Planning and Development, and now it is in dire need of men with training in the techniques of social sciences, so as to put its schemes into operation successfully. There is no adequate provision for training in scientific techniques of social service in our country, and now the Planning Department is sending 500 young men to be trained as Labour Officers in U. S. A. at a cost of Rs. 35 lakhs in six months! Thus goes on in India a colossal waste of money and time. Had the Central Institute come into being at the time it was recommended the Government of India and the Universities would be having at their disposal corps of young men trained in social welfare work.[1]

1. The observations of the Director of the Sir Dorabji Tata Graduate School of Social Work in Bombay made to the Central Advisory Board of Education, in this connexion, make interesting reading and throw some light on the mentality of the Director. 'The Director has expressed the opinion that the time is not yet ripe for starting centres for the training of social workers in each province since the principle of professional training for social work has not yet been commonly accepted, and the idea that any person can do social work prevails. Thus if social workers are trained in the several provinces the problem of unemployment will be simply aggravated. In the Tata School, 20 or 25 students are admitted every two years, so that the supply may remain below demand. The result is that all the workers turned out are absorbed. It has been suggested that the Tata School should be made an all-India institution and should be subsidized by grants from the provinces. The Central Institute, if started in Delhi, can function as a Research Institute.' —From Proceedings of the Seventh Meeting of the Central Advisory Board of Education in India, January 14 and 15, 1942, p. 65.

This is tantamount to saying that unless people recognize the existence of science of medicine, they should be allowed to suffer and the supply of medical practioners should be kept low. In a backward country like India, 20 or 25 trained social workers every two years would be like a drop in an ocean. The foreign experts, invited by the Government of India in connexion with medical service development, have recommended 600 colleges of medicine and surgery. The same

THE INDIAN SCIENCE CONGRESS

But the organization that has shown signs of interest in the problem of the social change in our country is the Indian Science Congress Association. Following the example of the International Council of Scientific Unions, located in Holland, and of the American and the British Associations for Advancement of Science, the Indian Science Congress brought into being a Sub-Committee of Science and Social Relations, with the following aims: (a) to suggest to the Executive Committee topics for joint discussions and lectures, etc. relating to the influence of science on India; (b) to formulate proposals for collecting data and taking necessary steps to put into effect such proposals under the authority of the Executive Committee relating to the effects of science on society in India and to matters incidental thereto. The Sub-Committee took definite shape at the Benares session of the Indian Science Congress, in January 1941, and the present author was elected as its Secretary. At the following session held at Baroda in January 1942, he was invited to give a public address on 'Science and Indian National Reconstruction'. The address was published by the Indian Science Congress and distributed to all the members.

In 1944, the Congress received a special donation to depute the author to deal with this subject in a series of three lectures to be delivered at all the universities in the country. The present volume is the outcome of that lecture-tour. As can be seen from the opinions of some of those who presided at my lectures, the attention of the institutions of

holds true of social services. To speak of unemployment for trained social workers in India sounds so ludicrous! And the need for a large number of workers was realized by Sir Francis Younghusband who called a meeting to mobilize opinion in this matter as early as 1936 and sent out a memorandum to the Government of India.

higher learning has been focussed successfully on the problem that confronts our country.

But it can be easily seen that while the votaries of exact sciences are conscious of the social relations of science, their chief interest must lie in the advancement of their cause, science, which does not suffer from an over-enthusiastic support of an alien government and an apathetic, poor public. The significance of social changes going on in our country and the need of controlling them must become, by their very nature, the chief concern of the social scientists. They are the people most eminently fitted for the task. To teach the teachers is the crux of the problem. This problem must be tackled in a different manner.

INDIAN ACADEMY OF SOCIAL SCIENCES

There are, in our country, various Learned Societies, composed of teachers of different social studies. Some of these Learned Societies are:

1. The Indian Geographical Association
2. The Indian Biological Association
3. The Indian Anthropological Society
4. The Indian Psychological Association
5. The Indian Statistical Association
6. The Indian Philosophical Congress
7. The Indian Historical Congress
8. The Indian Political Science Association
9. The Indian Economics Association

Perhaps there are some other similar organizations, engaged in problems of social study and research. These various Societies hold their annual sessions in different places. Thus, the scholars attending session of one Society in one part of the country have to rush to another Society holding its session far away, read a paper and attend to its administrative work. The consequences are

indeed disastrous. These representatives of different segments of social reality do not come together, exchange views and thus develop an integrated, synthetic approach to their own fields of study and to the national problems. Thus, quite unconsciously, India's social scientists perpetuate the most dangerous tradition of European education and thought, which is emphasis on particularistic point of view. These scholars have developed academic insularities and drawn forbidding intellectual frontiers around their fields thus deluding themselves with the thought that the solution of every national problem falls within the ambit of their specialized fields of knowledge. Consequently, there is no co-ordination of various social studies at undergraduate and university levels, no synthetic approach to the problems facing our country and no broad outlook among the social scientists themselves. Intellectual isolations have become firmly entrenched behind vested interests where the votary of each social science considers his neighbour a competitor and an interloper. There is an atmosphere of artificiality and unreality about the whole system of our education, which does not deal with life as whole, while the Learned Societies carry over these attitudes into the larger arena of our national life.

This, then, is a rough picture of the situation with regard to social studies as it prevails in our country today. We have organizations and institutions, but they lack co-ordination and clear perception of the issues at stake. India is the scene of clash of cultures today, but she is to be the Shrine of Synthesis of Cultures tomorrow. This is the meaning and purpose of planning in India. All these organizations can be yoked to the service of the country. These various societies should be brought together, so that they can pool their resources of scholarship and research, without sacrificing their individuality and independence, and

present to us a picture of the India-to-be and the ways and means of realizing that goal. Such a stupendous task could only be undertaken by an Indian Academy of Social Sciences which could synthesize the labours of the students of geography, biology, anthropology, psychology, statistics, philosophy, sociology, history, political science, economics and other allied social sciences. The Indian National Planning Committee may resume its labours some day when its leading lights are liberated, but it must complete its labours, and disperse. The Sub-Committee of Science and Social Relations of the Indian Science Congress, composed of a few specialists whose chief concern is research in exact sciences, could only scratch the surface of the problems with its finger-nails, while the votaries of social sciences are doing it—at least are expected to do so—with steam-shovels. An Indian Academy of Social Sciences would be a National Planning Commission in permanent session, a Brain Trust of the nation, and India would be spared the humiliation of importing 'experts' from abroad to do her planning. Such an Academy could give a new orientation to our education in our effete universities, urging them to co-ordinate their Departments, now ranged in hostile camps, to come together into Schools of Social Sciences.

Having been dedicated to the study of Social Sciences for over a quarter of a century, both in India and America, and having watched for many years the sterile system of education prevailing in our country (if the reader will forgive this immodest and personal reminiscence), the author came to the conclusion that side by side with the focussing of the attention of our educators on the need of introducing Sociology and establishing a Central Research Institute and Training Centre for Social Sciences and Public Administration in the Government of India, a simultaneous attempt should be made to wean our teachers away

from their infructuous annual lucubrations and canalize their activities into fruitful, constructive channels by starting such an Academy. At least, nothing would be lost by sounding public opinion. With this aim in view, the author made an extensive tour of the whole country in the early part of 1941, visited several universities and discussed the matter with various friends and leaders, and he found all of them very favourably disposed. All the Vice-Chancellors excepting one favoured the idea. The Secretaries of some of the Learned Societies expressed approval of the scheme and showed willingness to fall in. Various leaders and éducators were also approached to express their opinion, and it is a matter of genuine gratification that the scheme met with uuanimous approval. Some friends in Sind even undertook to invite the first session of the Academy, if it were actually brought into being. The approach of war, however, to the Near East in the same year pushed the plan into oblivion for the time being.

But some interest was shown in the idea at the Baroda session of the Indian Science Congress held in January, 1942, and the author felt encouraged to invite the Sub-Committee of Science and Social Relations, Indian Science Congress, to take up the matter for its official consideration. Professor D. N. Wadia, President of the Indian Science Congress that year, also favoured the idea. During the course of the year, the author went to Wardha to place the scheme before Pandit Jawaharlal Nehru, President-elect of the Indian Science Congress for the ensuing year. The two together discussed the plan from various angles and Panditji gave it his benediction. Prior to his arrest within a fortnight of this interview, he wrote to the General Secretary of the Indian Science Congress and suggested appointment of a Committee of Experts to explore the possibilities of bringing such an Academy into being. Professor Wadia,

who continued in his Presidential office in the absence of Pandit Jawaharlal Nehru, recommended the scheme to the Indian Science Congress for its consideration. In his Presidential Address at Calcutta in January 1943, he said: 'It is too early to outline the exact task to which the Academy will address itself. Its chief function will be to explore those avenues through which the contributions of science may be adapted to the life of the individual and the nation, without allowing any anti-social applications of science such as have made a shambles of so many countries, ever raising their heads in our midst. Secondly, the Academy will emphasize an integrated, synthetic opproach to every problem, pressing into service the contributions of various basic social sciences such as human geography, anthropology, biology, psychology, economics, political science, statistics, philosophy and sociology. The bringing into being of a National Academy so constituted may well become a crowning achievement of the Indian Science Congress.'[1]

AN INDIAN ACADEMY

While these attempts were being made to interest the universities in Sociology, the Government in a Central Institute, and the Learned Societies in an Indian Academy of Social Sciences, the Government of India announced its intentions of introducing legislation to bring into being a Society, analogous to the Royal Society of Great Britain, to co-ordinate the various scientific bodies engaged in internecine warfare in this country. Were such a Society to become a reality, it would emphasize natural sciences at the cost of social sciences, as has been happening in Great Britain. It was at this time that the author received a communication from Sir John H. Clapham,

1. Wadia, D. N., *Presidential Address*, Indian Science Congress, Calcutta, 1943

President of the British Academy, for which the former shall always remain grateful. Sir John's letter deserves to be quoted in full. He says:

'The fact that we in England have a Royal Society for "Science" and a British Academy for "Learning" is an historical accident which has unfortunate results. It would be a great pity if India were to perpetuate this cleavage. China has recently founded the *Academia Sinica* to cover all learning — very wisely. Our division bears hardly on those "social sciences" in which you are specially interested. *Economics* are in the British Academy. The physical side of *Anthropology* is in the Royal Society, but the social side is between the two bodies. *Archaeology* belongs to the British Academy but its bearing on *Anatomy* (skeleton) etc. is for the Royal Society. So I might go on.

'I agree with you most profoundly that India cannot afford to honour the Physical and neglect the Social Sciences. What I should work for were I an Indian man of learning of any sort would be:

An Indian Academy

Sections: (a) Mathematics and the Physical Sciences.
(b) The Biological Sciences
(c) The Social Sciences
(d) Philosophical and Literary Studies. ......

That is my dream for India as it would be for England were we starting afresh. The Royal Society was not originally intended for experimental sciences only. When the British Academy was formed fifty years or more ago it was not founded until the Royal Society had refused to expand into an Academy such as I advocate.

'May I repeat that, in my judgement, the study of society is, for India in particular, not less but more important than the study of nature?'

The need for an Indian Academy, such as Sir John

Clapham envisages for India, is not only to serve some academic end, but to assist in the stupendous task of enabling India to rediscover her real self and thus save herself and the world. This is India's *dharma*. She cannot neglect it without courting disaster, as she cannot fulfil it without mobilizing her resources—natural, human and spiritual. The need for such mobolization is seen by another Englishman and is brought out very forcibly in the following words: 'A culture which said, "We are ignorant and divided and condemned to a collective sterility by our ignorance, but we mean to reorganize our mental energy and stock our minds to play our part in human unity," would be a culture to respect. But even the Brahmo Samaj, most liberal of Indian cultures, does not say that. It is universalist religiously, but it is not acutely educational. In India there are numerous rich men, great industrialists, wealthy Maharajas and the like, but it has still to dawn upon any of them that a great, growing, liberating mass of knowledge exists in the world beyoud the present reach of any Indian, and that there must be scores and hundreds of thousands of fine brains which need only educational emancipation and opportunity, laboratories, colleges, publication facilities, discussion with the rest of the world, to add to a continually increasing Indian contribution to the ever-learning, ever-growing World Brain. In India there must be a score of potential unrealized Royal Societies, so to speak, running about in loin cloth and significant turbans and Gandhi caps and what not, running about at the low partisan level, and so running to waste.'[1]

'To reorganize our mental energy and stock our minds to play our proper part in human unity,' and 'to add a

1. Wells, H. G., *The Outlook for Homo Sapiens*, 1943, p. 142.

continually increasing contribution to the ever-learning, ever-growing World Brain,'—these magnificent sentiments and aspirations for us by a noble Englishman need reiteration. Cultural synthesis, with the aid of social sciences, is not only a national necessity for India, but a world responsibility that Providence has placed on this country. But before India can discharge her duty to the world, she must set her own house in order. Be it peace or war, India must learn the art of integration. The wars of today, whether destructive or constructive, are planned and fought in the Academies. The war against human pain, ignorance, poverty, personal disintegration, is carried on by groups of specialists working in concert in Schools of Social Work, by Social Science Research Councils and Academies of the type outlined here. Similarly, Germany's timed victories over her small neighbours were planned and won in the Geopolitic Institute of Dr Karl Haushoffer in Munich, where every social science was pressed into service for mapping out the stupendous strategy involving the human race. Waterloos are no longer won on the cricket fields.

Some efforts have been made to interest these 'rich men, great industrialists and wealthy Maharajas and the like', but without success. An Indian Academy with adequate endowment to enable various Sciences to come together and focus their attention on our country's problems must remain a hope and a dream, till our leaders are released and they set their hands to the task of building a new India. There is no danger of India falling a victim to the ambitions of world domination and conquest *a la* Huxley or Hitler — though, living in a world of today, she must be equipped in the arts of war no less than in the arts of peace. She will find education in both sciences and

technology essential for self-preservation. But that should not happen at the cost of liberal arts and the humanities; India must cultivate them also for the fulfilment of her destiny. Indeed, this aspect of education is more important, since India's method of adjustment to the cultural assault of the West is of world-wide significance.